## DOCUMENT RESUME

ED 055 649 PS 004 820

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|---|---|
| AUTHOR | Deutsch, Martin; And Others |
| TITLE | Regional Research and Resource Center in Early Childhood. Final Report. |
| INSTITUTION | New York Univ., N.Y. Inst. for Developmental Studies. |
| SPONS AGENCY | Office of Economic Opportunity, Washington, D.C.; Office of Education (DHEW), Washington, D.C. |
| PUB DATE | 1 Jun 71 |
| NOTE | 172p. |
| EDRS PRICE | MF-$0.65 HC-$6.58 |
| DESCRIPTORS | Academic Achievement; *Curriculum; Curriculum Design; Disadvantaged Youth; *Elementary Grades; *Enrichment Programs; Evaluation Techniques; Individualized Instruction; *Kindergarten; Longitudinal Studies; Parent Participation; *Preschool Programs; Test Results; Tests |

ABSTRACT

The Institute for Developmental Studies (IDS) program has evolved into a comprehensive 5-year enrichment curriculum running from prekindergarten through third grade. The academic progress of both IDS and control children was monitored over the 5-year period by administration of standardized tests and special tests developed for the program. Observational procedures were also used. Findings indicate that IDS children who experienced 5 years of enrichment generally outperformed control children on a number of measures of ability and achievement and appeared to maintain much of their early enrichment advantages over their controls. On those measures where rote memory or mechanical operations were extremely important, there were no significant differences between groups. The more effective elements of the curriculum appeared to be those that were both cognitively and linguistically based. Twenty-four tables of descriptive data are interspersed within the text. A separate appendix lists 51 tables of statistical analysis. Specific information about the essentials of the IDS math-science program and daily logs from kindergarten and prekindergarten are also included. (Author/WY)

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# REGIONAL RESEARCH AND RESOURCE CENTER IN EARLY CHILDHOOD

## FINAL REPORT

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June 1, 1971

The research reported herein was performed pursuant to a grant with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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## ACKNOWLEDGEMENTS

We would very much like to thank all of the cooperating educational personnel, with special thanks to Dr. Bernice Fleiss, Mr. Charles Wilson, and, most of all, Dr. Clarence Senior.

We wish to thank all the teachers, assistant teachers, and research personnel who gave of their time and energy. We would like to further thank all of the cooperating individuals, too numerous to note, and call attention to the list of staff in Appendix IV.

We would like to extend our sincerest appreciation to Professor Richard Ellis, Mrs. Fay Boulware, Mrs. Fay Fondiller, Mrs. Laura Schneider Ellis, Mrs. Joan Ehren, Mrs. Shirley Fischler Walton, Miss Edwina Meyers, Mrs. Caroline Saxe, Miss Edith Calhoun, Dr. Edward Ponder, Dr. Florence Schumer, Mr. John Dill, and the late Dr. Lassar Gotkin. We wish to further thank Dr. Leo Goldstein, Dr. Rhoda Cutler, Mr. Howard Tilis, Mr. Norman Wein, Dr. Martin Whiteman, Dr. Estelle Peisach, and Dr. Linda Solomon. Mrs. Robin Axel, Miss Karen Adeeb, Miss Janet Terry, Miss Carol Kerr, and Mr. George Murga worked diligently in typing and editing the final form of this document. We are grateful to the Ford Foundation and the Carnegie Foundation, as well as the Office of Education and the Office of Economic Opportunities.

Finally, we especially wish to extend our appreciation to the children and their parents. Our results are contingent upon the future of all the children we worked with: our pride depends on the extent to which the children see us as having had a positive influence on their growth.

## INTRODUCTORY SECTION

### BACKGROUND

In a very real sense, the work reported in the pages that follow had its inception in data which the senior author collected in the early and mid-1950s. Those data indicated a disparity in both school achievement and self-concept between black and white middle and lower class fourth, fifth, and sixth grade children in two New York City public schools (Deutsch, 1960). With only a few exceptions, difference in school achievement was in favor of the white and the middle class children, and white children also were found to have a far more positive self-image than did the black children. In an effort to describe and analyze at least some of the dimensions of these differences, and to determine when they developed, a large study of language functions, other cognitive variables, self-concept, and home environment was begun under the auspices of the newly-formed Institute for Developmental Studies (IDS). Balanced cross-sectional samples were drawn from the populations of first and fifth grade, middle and lower class, black and white children of the New York City public schools. Some of the major results of this study (Deutsch, 1965; Bloom, Whiteman, and Deutsch, 1965; Whiteman and Deutsch, 1967) indicated that social class and race differences were present in the first grade, but that they were much greater in the fifth grade samples (described as the "cumulative deficit," Deutsch and Brown, 1964). The data also indicated that differences between social classes were far more pronounced than between races at the first grade level, but that the number of variables sensitive to race increased by the fifth grade (Deutsch, 1965). These findings were consistent with the language findings of Templin (1957) and Bernstein (1960), and with the later reports of Cazden (1965), and others.

As a result of this research, and in keeping with the orientation of the multi-disciplinary group of investigators at IDS toward exploration of environment-behavior relationships, it was decided to attempt to avert the language and achievement differentials between the so-called "disadvantaged" children and their middle-class counterparts by providing an enriched preschool experience. Because public school education was available to children at the kindergarten level in New York City, the intervention program began at the prekindergarten, or nursery year, level, with four-year-old children. A one-semester pilot study was conducted, beginning in September of 1962, and the intervention, or enrichment, program began its first prekindergarten classes in January of 1963, with the support of the Ford Foundation and the New York City school system.

While no similar program was in existence at that time, the effort was consistent with a general resurgence of interest in the effects of early environment on children's learning, and in the training of cognitive processes through the use of special programs. Hunt's book, Intelligence and Experience (1961), reflected and advanced this trend, rejecting the notion of the fixed IQ, and performing a kind of scientific rehabilitation of earlier attempts to change IQ and life achievement through early intervention (Skeels, et al., 1938; Stoddard and Wellman, 1940; Stoddard, 1946; Skeels, 1965). At about the same time, Lee (1951) replicated the earlier Klineberg (1935) findings that as Negroes migrated to the northern urban areas (and away from the rural South with its segregated schools), their IQ scores increased. The fact that northern white IQs tended to be higher than southern white scores contributed further to the assumption that the quality of educational facilities available to children was related to their cognitive skill levels, at least to the extent that these could be measured by intelligence tests. Of course, the emphasis on the role of the school was also consistent with the social ferment which accompanied and followed the 1954 Supreme Court decision outlawing segregation in the public schools. The Sputnik-inspired concern with the academic quality of American schools (e.g., Flesch, 1955; Conant, 1961), together with the then new emphasis on the work of Piaget on the development of children's cognitive processes (e.g., Hunt, 1961; Flavell, 1963), also served to enhance the acceptability of a school-type program for young children.

Even with this background and general climate, however, acceptance by educators of cognitively-oriented schooling for four-year-old children was hardly immediate, being preceded in many circles by severe criticism of the pressure on fragile young affective structures presumably entailed by such programs. Their status as reflections of an "idea whose time has come," however, is illustrated by the fact that between 1965 and 1970 about a million and a half children were enrolled in preschool programs. As early as 1966, Gordon and Wilkerson were able to write a book listing and describing a wide variety of preschool programs. This rapid growth is in large measure concretely attributable to the Federal anti-poverty effort, and its emphasis on and funding of such programs under the "Head Start" rubric.

This programmatic burgeoning was too sudden to have allowed for the development of longitudinal data as to the effects of early educational enrichment, nor even of extensive short-term evidence of its usefulness. Head Start was based largely on earlier data (such as the studies previously referred to), scattered and fragmentary reports of initial programs (including that of IDS), logic, theory, and faith. The idea of Head Start caught on so well and so immediately that critical evaluation and healthy skepticism were washed away in the tide of great expectations. Of necessity, massive programs were hastily mounted, personnel were too quickly trained (there still exists a shortage of trained experts in early childhood development and education), and enthusiasm too frequently substituted for curriculum design. No wonder many of the early evaluation reports were disappointing: too much was expected in the first place, and too little was finally achieved. As the senior author has remarked elsewhere, behavioral experiments do not enjoy the same tolerance accorded such dramatic programs as moon shots: when the first few American rockets failed, the response was to try harder and put more resources into the program; when the first Head Start reports fell short of expectation, the response was too frequently to call the program a failure and abandon it. The sober reality is that children born and reared for four years under conditions of poverty and discrimination cannot be expected to shed the negative academic effects of such a background as a result of even the best special summer program. And, no matter how good or how effective the summer program, if the children are subsequently enrolled in a school that has not been reevaluated in terms of their needs nor modified to maintain continuity with the special program, gains made will inevitably be diminished or lost altogether.

In this context, description of a longitudinal program and careful evaluation of the data gathered as to its effects can be especially important to the achieving of a realistic and rational appraisal of early childhood educational interventions. That is the purpose of the present report. The IDS program was longitudinal, enrolling children from the prekindergarten year through the third grade. It was evaluated according to an extensive research design, involving three different control groups for each experimental group, and three "waves" of children went through all five years of the program, while a total of eight waves went through the first year, seven through the second, and so on. The program itself operated on many mutually reinforcing levels, and was also unified through the integration of the basic and applied research conducted at the Institute with efforts in demonstration classrooms and programs of in-service and extramural training. The intent was to maintain the program as an evolving one, responsive to changes in both children and environment. It did not represent, nor was it designed to test, any single developmental or educational model; different elements of the program can be traced to a wide variety of theories and practices, including Piaget, Dewey, Skinner, Montessori, and others, and to the data derived from experiments and studies of a wide range of children's behavior and ages.

Formulation of the program and its curriculum was illuminated by several basic assumptions, of which the primary one is that environment is a critical variable in the shaping of cognitive as well as affective growth. Corollary to this assumption is that the type of environment and the nature and timing of the child's experiences within it will be highly influential in determining the quality and level of his development. Another broad assumption is that continuity for the child between his home and his school experiences will enhance his development. These fundamental assumptions led to the attempt to provide an environment for a child in which carefully planned curriculum elements offered a logical progression in the presentation of stimuli designed to be appropriate to each child's developmental level. A parent program (without coercion to participate) was an integral part of the plan from the beginning.

Initially, both the demonstration and its evaluation derived their major funding from the same agency (the Ford Foundation), with a substantial contribution to the demonstration coming from the New York City Board of Education in the form of space and head teachers' and supervisors' salaries. When the Office of Economic Opportunity was founded, the Institute became one of its Regional Research and Resource Centers in Early Childhood. OEO funded mainly the demonstration portion of the program, and also provided means for disseminating information about procedures and techniques. A separate grant to continue the extensive evaluation of the effects of the program came from the Office of Education, and dovetailed with the modicum of evaluation provided by the OEO funds. New York City continued its contribution in the same form. Because it is both difficult and unwise to separate the description of a program from a description of its evaluation and the data derived from it, the report that follows includes both the work supported by OEO and that supported by OE. Separate fiscal and interim reports rendered to the two agencies can be referred to should there ever be any necessity for unravelling the specifics of their individual contributions.

Basically, the results of the eight-year program support the hypothesis that long-term, longitudinal intervention programs can have positive and lasting effects on the academic performance and cognitive and language development of children from backgrounds which are disadvantageous with respect to their scholastic achievement and the later occupational productivity and accomplishment so closely associated with it. Further specific analyses of the data yield some information about and provide some basis for speculation as to the elements of the program which influenced performance in particular areas.

## METHODS

### Curriculum Abstract--Summary Description of the Intervening Variable

The IDS curriculum was designed to begin at a basic level and to emphasize those areas which have been found to be most operative in later learning; these included the cognitive areas of language, perception, and concept formation, as well as the affective area of self-concept.

The overall aim of the experimental program was to enable children to reach levels of cognitive functioning which generally have been considered necessary for successful school experiences. Moreover, the IDS program was designed to help children acquire a degree of proficiency with academic skills, some independence as learners, and feelings of confidence as learners.

To achieve these overall aims, several basic approaches were developed and used throughout the program. These persisted throughout the expansion of the program, as new grades were added and as the original curriculum was supplemented. Despite the continuous evolution of the program and the dynamic interplay of various other factors (e.g., developing curricula, personalities of individual teachers, changing needs of particular groups of children, social change in the community, uncertainties of funding), these methods were consistently applied.

One of the important aspects of the IDS program was the care that is taken to make the materials and tasks appropriate to each child's development level. The individualizing of instruction that resulted from this care was a method that pervaded each step of the entire program. The materials, curriculum, physical arrangement of the room, and program of assessing individual children's strengths and weaknesses were all designed to meet the needs of children who were, by and large, organized in small instructional groups. In accordance with the philosophy of individualized instruction, no stringent goals were set for each grade level; the child was allowed to proceed at his own pace, in accordance with his own needs and abilities.

A second characteristic, common to all phases of the IDS program, was the recurrence of specific tasks throughout the classroom and throughout many of the activities of the day. The task of size discrimination, for example, recurred in such materials and activities as: the three sizes of jars available for painting, the various sizes of blocks that had to be put back appropriately on the shelves the discussion at circle time or lunch time, the various games available for quiet time, etc.

To facilitate its overall aims, a unique staffing pattern was developed by IDS; such a pattern persisted during the expansion of the program and existed on all grade levels. The IDS team consisted of teachers, assistant teachers, curriculum specialists, and supervisors, whose work was coordinated by a curriculum director. Both assistants and teachers engaged in pedagogical activities in the IDS classroom; assistants were trained and expected to perform actual teaching, rather than merely custodial, functions. Curriculum specialists, and outside resource people worked closely with the teachers, assistants and supervisors in a program of inservice training.

In addition, the IDS supervisory pattern was characterized by a small number of teachers assigned to each supervisor. Generally, each supervisor was responsible for the staff of no more than six classrooms. For the most part, supervisors acted in a supportive manner and demonstrated their suggestions by actually working with children and introducing materials into the classrooms itself. In addition to their work with teachers, IDS supervisors periodically met with each other to plan their activities and discuss common problems.

A fourth fundamental and persisting aspect of the IDS program was the emphasis that was placed on inservice training of all supervisory and teaching staff. Through a variety of activities (e.g., workshops, conferences), the performance of teachers and pupils could be discussed. Such activities not only provided feedback on the appropriateness of the current curriculum, but also allowed for the introduction and exploration of new ideas, methods, and materials. Thus, staff and program development were built into the design of the IDS program; they helped to insure the maintenance of a dynamic educational environment for the teachers and supervisors, as well as for the children.

A final basic aspect of the IDS program, to be mentioned only briefly here, was the commitment to an active and ongoing program of parent involvement. The IDS staff continually stressed the importance of such involvement to the academic success of the children, as well as to the efficacy of the enrichment program.

In the IDS program, the child's activities were defined so that they began with the most basic skill level, and then they proceeded sequentially through succeeding levels, with increasing complexity. The steps leading from one level to the next were designed to provide a manageable challenge for the child. Activities were paced for each child so that he could proceed from element to element at the rate most comfortable and reinforcing for him.

A number of techniques and special materials were used to help to accomplish IDS goals. Only a few examples, from among the many materials and techniques that have been developed and used by IDS will be cited here.

The Language Master is one such learning device; it was used in a number of ways to build vocabulary and enhance the understanding of basic concepts. With this recording device, a taped voice identified an object or concept which was represented by a picture on a cord. The cord moved through the machine exposing that object or concept as the taped voice stated its name. Finally, the child

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identified the object and recorded his own voice, and then compared his speech pattern and sentence structure with that of the taped voice.

One of the games which was developed at IDS is Language Lotto. This game is similar to standard games of Lotto,but moreover, it can be played at differnet linguistic and conceptual level, ranging from nonverbal matching to verbal matching of pictures, requiring increasingly complex cognitive skills.

Teaching strategies, such as the scheduling of a Quiet Work Time within the preschool day, also were designed to meet IDS program goals. During this time, all noise-producing activities were suspended and children worked with such materials as puzzles, individual learning games,etc. During this time, teachers were able to work on a one-to-one basis with children, and to guide their individual and small group activities.

IDS children also worked with published curricula (such as the Stern and Sullivan reading programs and the AAAS process approach science materials) as well as with a plethora of Institute-developed learning games and individualized learning materials.

This description is a very brief summary of the IDS curriculum, and has been provided for those readers who need only an overview of curriculum methodology and orientation in order to understand the interpretation of the evaluation data presented in this report. A more detailed description of the longitudinal curriculum, enrichment, and of some of the IDS materials, follows.

# Curriculum Description

## Introduction

The following is a fuller description of the major components of the five year experimental program. The Curriculum Abstract presented was prepared in collaboration with the social scientists and curriculum specialists who have been involved with, and have been continuously observing, the evolution of the enrichment program. However, the statement suffers from the limitations inherent in a summary, as opposed to a full description. It should also be made clear that the curriculum was truly an evolving one: many more elements were tried, modified, incorporated or discarded than can be reported in this brief statement.

Since the curriculum was designed to be continuously evolving some of what is reported here has undergone subsequent modification. The program has been appropriately expanded and deleted wherever it was indicated by the reactions of teachers and students. However, for the most part, this outline represents the experimental treatment of the subjects whose performance is reflected in the test scores that are reported later in this monograph.

An overall description of the prekindergarten and kindergarten programs will be given first. After that, each curriculum content area, together with relevant examples of materials, will be described for the entire five year time span (from prekindergarten through third grade).

## Prekindergarten and Kindergarten program

This portion of the IDS program is its oldest and most developed part. Prekindergarten classes began for Wave I in January, 1963; kindergarten classes were added in the fall of that year.

One of the most important assumptions underlying the original preschool program was the idea that an orderly and sequential presentation of stimulie is extremely important to the development of young children. This sequential presentation generally has been thought to be requisite for full perceptual and cognitive development. Based on this assumption, the physical arrangement of the experimental classroom was designed to provide an ordered arrangement of stimuli; opportunities for learning experiences were built into the arrangement of materials and organization of the classroom.

The preschool room was divided into clearly defined areas, each representing a learning center of the classroom: doll corner, library corner, quiet work area, block corner, listening center, etc. Non-verbal cues were provided in many of these areas to promote activity and learning. For example, colored adhesive plastic film was cut to match the size and shape of each type of block. This film was then mounted on the shelves where the blocks were stored, and served both to indicate how the blocks were stacked on the shelves and also to provide a visual matching experience for the children when they put the blocks away.

Non-verbal cues also helped to indicate the type of behavior that was appropriate in a particular area at a particular time. For example, when the children were working with blocks, a rug was laid down in a corner reserved for block work. This minimized the distracting noise that was associated with block building and also indicated the appropriate activity for that area. For example, when the rug was rolled back, the area was used for another activity. In time a child was able, without specific instructions, to judge the appropriate time and place for an activity such as block building. In this manner, the rug, plastic film, and many other such non-verbal cues became meaningful substitutes for specific verbal instructions.

The physical arrangement of materials in the IDS classroom also helped to promote learning activities. Materials were arranged with regard to common attributes of function and with a view to facilitating problem solving with respect to size, shape, texture, color, and other discriminable attributes. Materials were stored in clear plastic boxes, so that a child would easily take equipment for himself and replace it in the appropriate spot when he was finished.

All of the materials required to do a specific task were stored together: e.g., the paint, paper, brushes, water, apron, and the other materials needed for painting were placed near each other. This encouraged a child to engage in and internalize a sequence of specific actions which were related to each other and to some final goal or task. For example, the sequence for painting might be: first putting on an apron, then filling the water jar, then opening the jars of paint, then dipping the brush, then painting, then cleaning the brush, and so forth. Children could modify the sequence and procedures as appropriate or as they choose, but storing all the components together was intended to facilitate developmental goal-related sequences in behavior. Generally speaking, the children seemed to need a degree of organization if they were to master a task and be able to handle the increased complexity in any activity which resulted from the introduction of new elements. In addition, sequential patterns of behavior could be repeatedly utilized, as they helped in evolving sense of order and procedure that could be applied to new and changing situations.

This can also be seen through the child's use of the Letter Form Board (a piece of equipment developed at IDS).[1] The Board consists of two rectangular panels that are joined by a hinge at the top that permits it to stand like a two-sided easel. Each panel consists of letter-shaped slots into which fit individual letter-shaped pieces. One of the panels holds a lowercase alphabet, and the other an uppercase one. There is room for two replicas of the same letter in each slot. The Board is so designed that letter pieces of similar outline cannot be interchanged in their respective slots. That is, the capital P will not fit in the B, the C will not fit in the O slot, etc.

A child can use the Letter Form Board for a number of different purposes and in a variety of ways, some of which are described in the Reading and Language Arts section below. However, no matter what the approach or objective, the child can develop a certain sequence of behaviors, which he can repeat, and perhaps later modify, when he works with the Letter Form Board. For example, he might follow a sequence such as:

1. remove the plastic strip covering the letters he is to work with;
2. remove all the letters that are exposed, using a "letter spoon" to take them out of their slots;
3. classify the letters in some way (e.g., group pairs of the same letters together);
4. match the letters to the slot, following a left-to-right progression;
5. repeat this procedure with each successive row.

A sense of sequence and procedure was enhanced by arranging the schedule of activities into specific but flexible time blocks; these activities occurred regularly from day to day, or from week to week. Preschool days, for example, were divided into recurring activity sequences such as: quiet work time, circle time, library time, etc.

Emphasis on routines and procedures was one of the primary features of the IDS curriculum during the first few weeks of prekindergarten. Another factor, common to the entire curriculum but particularly stressed at this

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1. This Board is now commercially available from Houghton-Mifflin Co.

beginning time, was the appropriate increase and decrease of the amount of material available for children to work with. When a child entered an IDS prekindergarten for the first time, he walked into a classroom containing a minimal amount of carefully placed materials: limited auxiliary equipment for the block corner; a limited number of blocks; a limited amount of audio-visual equipment; few puzzles; few games, etc. The room was not overburdened with stimulating equipment. Each item was placed so that it could be seen in its entirety; a child was given the opportunity to appreciate the object's qualities of length, depth, color, shape, etc., without the distraction of many other materials placed nearby. The amount of material available increased throughout the year to correspond to the child's increasing ability to absorb new stimuli.

During the first week or two of prekindergarten, children were "phased into" the program. The number of children present in the classroom increased each day, and the amount of time each child spent at school increased progressively. Thus, the child was not overwhelmed by a large group of children to cope with immediately, or by what for him would be a long time period full of new experiences. Instead, he was exposed to the classroom in small stages and given the opportunity to take in new stimuli at his own pace and to master what was planned to be a comprehensive environment.

The phasing in of children, as well as the availability of two adults in each room, facilitated the individualization of instruction, one of the most critical aspects of the entire program. During the early part of prekindergarten, teachers wereable to carry out fairly extensive diagnostic evaluations to assess the strengths and weaknesses of individual children, as well as of the group as a whole. Children could easily be taught what was available in the room; how to approach, work with, and handle equipment; where materials belonged so that they could be returned, etc. From the start, the child was shown how to work independently with the materials and equipment, and encouraged to function as an effective and confident learner in his classroom.

After careful assessment was made of each child's level of conceptual development, activities were planned which were designed to further growth in this area. Such activities were interwoven throughout the entire preschool program: in play with blocks, clay, paints, and other materials; in the use of specific language and mathematics games and manipulative materials; in music time and snack time; in cooking projects and in taking trips; in creative dramatics; and in a plethora of other experiences that constituted a rich early childhood program.

One of the most important parts of the preschool program was the Quiet Work Time. This time (usually during the first hour of the day) was designed to give the child a period of sustained exposure to learning games and other quiet activities that emphasized cognitive development and skill mastery. Immediately on entering the classroom, the children began working with such materials as Language Lotto, puzzles, sorting games, magnetized letters, small plastic linking blocks, color cones and size cones, and the like. These games were progressively modified as the child developed greater skill in perceptual and conceptual areas. During Quiet Work Time, all games and activities which led to noise and distraction (such as block building) were excluded. The teachers were free to work with individual children or with small groups; they could introduce new materials, led children to more complex use of current material, and planned for their individual and group needs.

Throughout the Institute curriculum a main emphasis was placed on helping each child to develop an image of himself as both a competent and a worthwhile human being. His thoughts and opinions were accepted, or carefully questioned; his individual talents and needs were recognized and built upon.

At the preschool level, efforts in this area were made to help the child develop an understanding of himself as a unique being. A camera was a standard piece of classroom equipment and was used to take pictures of children at different times during the year. These pictures could be found, for example, on each of the children's cubbies, along with a written label of the child's name. A special point was made to greet each child by name and incorporate the children's names in a variety of songs, games, and other activities during the day. A full-length mirror was placed in a doll corner so that a child could see what he looked like. (For many children, this was the first time they saw all of themselves--from head to toe.) Creative dramatics was used as a technique to help children gain insight into their own feelings and the feelings of others. This curriculum area gave the child the opportunity to 'try on' and elaborate different roles (as well as to develop language and conceptual skills).

One other way in which an effort was made to help a child to develop a positive self-concept was by arranging tasks into smaller units which he could easily master, and thus build a series of small successes that would help him to develop confidence in his own ability. For example, if a teacher held up a red circle and asked, "What is this?" there might be a variety of reasons for a child's inability to answer: he may not have understood the type of answer required, he may not have the specific language necessary to answer the question, or he may not have the conceptual ability to answer the question. The teacher could subdivide the task and could provide meaningful clues and associations so that the child could successfully answer the question on some level. For example, the teacher might have asked, "Is this a red circle or a green circle?" thus providing the specific language necessary for answering the original question and defining the task in simple color terms. Or, the teacher might have placed the red circle on a piece of red paper and asked, "Is this the same color or a different color?" thus further reducing the task to one of its more elementary components.

Such questions were used to adapt the total task so that it consisted of a series of small subtasks, each of which a child could handle. Such subdividing was part of the commitment to finding an appropriate level of complexity for each individual child and was important to the successful individualizing of instruction. It should be stressed that the subdivision of whole tasks must be tailored to the level of ability of each child: a series of steps that may have been appropriate subdivision of a task for one child may have provided too much or too little challenge for another. The child was to feel that each step represented a real accomplishment for him, not that it was merely a reflection of the teacher's desire to bolster his self-confidence.

Not all the activities discussed above occurred each day in the preschool classrooms; the intensity of exposure to, and emphasis placed on, each of these activities was adapted to meet the current needs of the children. Generally, however, one can say that the IDS preschool day was divided into time blocks of: breakfast time[2]; quiet work time; circle time; free play time; informal and formal book and story times; an active time of rhythms, games, or outdoor play; and lunch time.

Lunch time was structured to provide maximum opportunity for social interaction. Teachers and students sat together in "dining room" style so that conversation could easily take place between those sitting opposite each other, as well as those sitting next to each other. The emphasis placed on the identity of each individual was implemented here by giving each child his own place, with his own colorful plastic place mat and set of utensils. Continuity in the development of cognitive skills, begun during the day, was maintained during the lunch time. In one kindergarten class, for example, a teacher set up a model for the children to follow in setting out each place; this model re-emphasized sequences and left-to-right progression by having them first set the napkin and fork on the left and then the spoon on the right.

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[2] This practice resulted from recognition of the importance of nutrition early in the day and the fact that many children in the program were not given breakfast at home.

Each IDS teacher was given a great deal of latitude in adapting these broad curriculum outlines to meet the individual needs of her class. Daily logs prepared by several prekindergarten and kindergarten teachers are included in the appendix to this report. They give more specific information about the activities of preschool days.(See Appendix II)

The greatest progress in curriculum development by IDS was at the prekindergarten and kindergarten levels. In each of these programs, time was allotted for regular consultations betwen teachers and supervisors; time was made available to the teachers so that they could be involved with curriculum development. It was possible to do this within the regular work schedule of prekindergarten and kindergarten teachers because classes were conducted only during the morning, leaving the working afternoon free for these training and development activities. This arrangement, it was felt, greatly enhanced the evolution of the program.

The above discussion has been concerned primarily with the Institute's prekindergarten and kindergarten programs. In the fall of 1964, the work was extended to include a grades program, as the first wave of IDS children had reached first grade. In general, the structure and underlying philosophy of the preschool program was maintained in the design and operation of the grades curricula (e.g., individualization of instruction, staffing patterns, parent program, etc.). The curriculum that was developed for the grades elaborated on those areas emphasized in the preschool programs, and the curriculum was designed to help children reach higher levels of cognitive functioning and greater skill mastery. In developing the grades curriculum, the Institute's staff experimented with new materials and teaching methods, modified existing curricula, and developed materials and approaches of their own. As less overall time was available for it, curriculum development in the grades was not as extensive as that noted for the preschool segment of the IDS program. Nevertheless, the grades program evolved as a relatively cohesive entity, which will be described in the context of the various curriculum components extending from prekindergarten through the third grade.

### Reading and Language Arts - Prekindergarten through the Third Grade

Starting with the nursery year and continuing for the four subsequent years of the Institute's program, efforts were made to help the child develop his skill with language and to begin the teaching of reading. In this regard, several of the techniques that are used in the traditional nursery school were also employed in the Institute program (e.g., oral storytelling, trips, music, discussions). It is, however, the ways in which these activities were used in the IDS program that should be described.

A trip to the zoo, to take just one example, is replete with opportunities to continue the development of concepts, some of which have already been introduced in the classroom. In songs, discussions, and other activities before, after, and during a trip, children were involved in using such concepts as size differences (small and large animals); color differences (yellow giraffes and white polar bears); form differences (two legged and four legged animals); texture differences (furry and smooth skinned animals); etc.

In addition to such activities, a wide variety of materials was constructed by IDS staff and other materials and games which were generally available were modified or adapted. The "lotto" principle was adapted in a series of language games, for example.[3] They were used to help foster both conceptual and language development and were played by children on differing conceptual levels as well as by those with varying degrees of linguistic proficiency.

To play Language Lotto, each child is given a board with pictures on it. The player must determine on each card successively held up by a caller whether there is a match to one of the pictures on his board.

Each game in the series has three possible response levels. The first level is that of simple non-verbal matching: the child merely indicates by raising his hand that he has matched the card to a picture on his board. The second level can be described as a receptive-language stage, in that the caller describes the card, but doesn't show it to the players and the child must match the card to the picture on his board without the aid of visual cues, using only the caller's verbal description. The third level is a descriptive language stage: the caller takes a card from the completed board, and the player has to describe the picture that is left exposed on the board.

Each of the separate games in the Language Lotto series deals with a different level of language ability and with a different type of concept or relationship. For example, the first game involves the recognition of simple objects, many of which are commonly found around the classroom. The second game deals both with prepositions and with positional concepts (e.g., matching pictures and cards of a man under a chair, next to a chair, on a chair, etc.). Other games involve the use of verbs (action cards); conjunctions (the boy and the girl); singular and plural (boy, boys); etc. The most advanced game in the series involves the abstraction of particular relationships (e.g., matching a hand with a glove that fits on it).

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[3] One series of such games is now commercially available as "Language Lotto" by L.G. Gotkin.

These games exemplify a type of activity that is suitable for use by several children whose levels of conceptual and linguistic development may vary. A teacher can work with several children of differing abilities at the same time by asking different questions and requiring different responses of each child. Moreover, children of differing levels of mastery can work together as a small independent group without the direct guidance of the teacher. One child may be appointed to act as "teacher" and work with other children who are perhaps not as efficient in their utilization of skills. The child who plays the role of teacher is given the opportunity to practice the language pattern of the teacher as set by her model when she was working directly with the children. The use of these games is therefore consistent with the overall approach to education that is operative throughout the IDS program; individualizing instruction, teaching in small groups, and promoting independent behavior.

The Listening Center is a major device that has been used in the Institute classes in order to reinforce auto-instructional and small group learning activities. The Listening Center has become an integral part of the IDS language curriculum from prekindergarten to third grade. The actual center is a semi-partitioned area of the classroom containing a tape recorder and several sets of ear phones. As many as six children can use the center at the same time; each child works individually with his own set of ear phones, away from the distraction of classroom noises. Special tapes are recorded by Institute teachers, supervisors, and curriculum specialists.

By way of introduction to the tape recorder and how it works, children recorded their own voices and played back the sounds that they produced themselves. This technique, of having the children record and listen to their own voices, was continued at a later point in the IDS grades program in language development. In addition to stimulating language, it reflected the attempt to assist the child in constructing a total image of himself.

The Listening Center was introduced in prekindergarten. The first tapes presented to the child were prepared by his own familiar classroom teacher, in order to provide him with a speech model and facilitate his attending to the previously strange equipment. At the early levels, the teachers recorded story tapes for the child to listen to; the tapes also included questions and blank time for the child to respond to the questions. At more advanced levels, particularly in the grades, the tapes were used as part of the reading and math curricula (to give programmed lessons) as well as part of the evaluation program.

The IDS program in the development of general language skills was supplemented by early efforts to begin the process of teaching reading. In addition to the type of prereading activities that were stressed in other preschool programs (such as manipulation of shapes in working with collages, puzzles, games, etc.), the IDS preschooler was offered exposure to letters and words which would later be part of his actual reading instruction. Part of this early exposure was provided by materials that formed the first part of one of the generally available methods of teaching reading (e.g., Stern, Sullivan), which were incorporated into the Institute reading curriculum.

The Stern method provides a series of workbooks and materials that are specifically designed for preschool use, and which emphasize the use of phonics in beginning reading. The Sullivan program also has a preschool segment: Readiness in Language Arts. This part of the Sullivan approach can be used as a separate program in and of itself. It differs from the rest of the Sullivan materials in that it requires the direction of the teacher, while the activities stressed in the later materials are designed for children to work with independently. The Readiness in Language Arts materials provide for early exposure to such concepts as left-to-right progression in reading, letter names, letter sounds, and syllables.

In addition to such published reading materials, children were offered an initial exposure to letters and words through specially developed IDS learning materials. For example, at prekindergarten children begin to familiarize themselves with the alphabet by working with the Letter Form Board, as previously described. This puzzle-like learning device introduces the young child to the alphabet initially as a sensorimotor experience which involves him in the concrete manipulation of letter forms.

As with other Institute developed materials, the Letter Form Board can be used in many different ways, on several intellectual levels, and for a variety of cognitive tasks. The Board can be used to teach the child to discriminate among letter shapes. It can also be used to familiarize children with the concept of left-to-right order in reading and, at a later level, to teach them the actual names of the various letters. The plastic letter pieces themselves can be used in a number of different types of activities. They can, for example, be used for classification tasks, such as sorting and matching capital and lower case forms of the same letter. Also, they can be used by the child to build his own name or that of one of his classmates, or to construct many other words.

A variety of letter games that center around the child's own name were devised by IDS for use with classroom materials other than the Letter Form Board (e.g., individual flannel boards and letters). These games provided interest in, and practice with, the formation of words from letters. They also formed part of the general, and consistent, effort to emphasize the child's own name and thereby helped to enhance his self-image.

The Language Master is an example of equipment for which special materials have been developed by the Institute staff. The Language Master is a species of tape recorder which records on and plays a length of tape which is on a laminated card, which also has room for pictures and/or symbols. In one set of cards which we made for it, the teacher's voice is heard on the tape first and than the child records his own voice and listens to his recording right after hearing the teacher's. In this way, he compares his speech pattern and sentence structure to the teacher's model. The machine and the card stimuli permit a child to hear auditory and see visual stimuli simultaneously. The opportunity thus to integrate stimuli is particularly relevant to the first part of the Institute's reading program, which begins by stressing the relationship between sounds and symbols.

The Language Master was designed primarily to be used as an auto-instructional device. However, it was found that when young children first began using it they needed a certain amount of direction and help. The amount of such direction and follow up done by the teacher has varied, depending on the individual child and the particular teacher. Some teachers listened to each recording with the child and immediately discussed it with him; others have merely spot-checked a few responses; and still others were completely non-directive. For some children, this early involvement of the teacher helped them to become more independent in their later use of the Language Master. It also provided the teacher with valuable diagnostic information about each child.

The initial exposure to reading offered to the child in prekindergarten and kindergarten was followed by experiences in the reading curriculum of the IDS grades program. The teaching of reading in the grades was begun by IDS in the fall of 1964, when the first wave of children had reached the first grade level. The IDS reading program changed considerably over the years, as various methods and approaches were examined, modified, and discarded, or incorporated into the developing reading curriculum.

The first reading program the Institute used in the grades was the standard public school basal reading program. Generally speaking, this emphasized the acquiring of a basic sight vocabulary as the first step in learning to read. The basal reading program was used in the Institute classes only for half of the first year, when it was replaced by the Stern method.

The Stern method is a total approach to reading that involves the use of a series of workbooks, graded from preschool through the elementary grades. The primary emphasis in this method is on phonics, and it begins by having the child focus on the relationship between sounds and symbols. The child moves from associating sounds with symbols to blending sounds and combining symbols in order to produce words, sentences, paragraphs, etc.

In the 1965-66 school year, a series of taped word recognition checklists was constructed (The Phonics Checklist). These checklists were administered to determine if the children had acquired the word recognition skills that are included in the Stern workbooks; it provided diagnostic as well as evaluative information to the teacher. It was found that, although most of the children had mastered the beginning phonic skills, many were still having difficulty with blending the phonemic elements into words. It also appeared that, by and large, the children had not acquired the minimum sight vocabulary necessary to begin reading books.

Consequently, several modifications of the original Stern program were made and introduced into the enrichment classrooms. Af first grade, for example, instead of introducing all twenty-six alphabet sounds and three blends, only ten initial sounds were taught; these ten sounds were, however, immediately blended into simple words (such as the) for the children to use in reading. Teachers observed that this practice seemed to increase the child's facility in reading new words, even though only a limited knowledge of sounds had been acquired. Also, a few sight words were taught to be used immediately by the child in reading a whole sentence. In addition, trade books and supplementary materials (such as the I Can Read Series, the Merrill Linguistic Readers, and the Bank Street Readers) were provided in an attempt to enhance the children's interest in reading and to give them further practice in using their skills.

After a review of the Stern method, and its effectiveness in the IDS classroom, the teachers and curriculum specialists decided to further modify their program by adding the Sullivan Reading Materials. The Sullivan program basically consists of two parts, both emphasizing phonics. The first part (for preschool) is the Readiness in Language Arts program, which has already been described. The second part provides materials that a child can work with independently, proceeding at his own rate and not having to meet any established grade goals.

The Sullivan materials are compatible with the Stern materials in that both programs emphasize phonics. However, unlike the Stern method, the Sullivan materials provide for the immediate application of phonemic elements to the formation of words. Moreover, the Sullivan materials provide the child with ample opportunities to review and check his progress as he proceeds through the reading program. These materials seemed to be suited to a program that placed great emphasis on self-pacing and independent learning. Although, in our opinion, there were inadequacies in both the Stern and Sullivan methods, the combination of these approaches and the additional use of supplementary materials constituted the core of the IDS reading program.

Some of the supplements to the combined Stern-Sullivan reading program included class newspapers, classroom lending libraries, supplementary texts and trade books, and the like - all types of elements which are part of most good grade school programs. In addition, however, there was an extensive repertoire of supplementary reading games which was developed by the Institute's teaching and curriculum development staff.

As part of the IDS reading program, children worked with some of the equipment to which they were introduced in earlier grades. For example, the Listening Center was used by children in the grades program by having them work with specially constructed tapes that help build comprehension skills; the Center could be used by teachers on all grade levels for diagnostic purposes in checking children's progress at all stages. As has been mentioned earlier, the Language Master could be used by the children in the grades to practice simultaneous auditory and visual discrimination of sounds, words, and phrases. This device was used in all grades to practice many of the skills used in reading.

Despite the changes in the reading program over the years, it can be characterized as a systematic attempt to build reading and language skills, starting from an initial appreciation of the sound-symbol relationship. Each part of the reading program was designed to follow a carefully constructed sequence of combining phonemic elements to build word recognition and comprehension skills. It should be again emphasized that this was an individualized, phonics and language based program, which allowed each child to pace himself and to apply newly acquired skills to more sophisticated tasks.

## Mathematics and Science Curriculum - Prekindergarten through Third Grade

The Institute's programs in the mathematics and science areas can perhaps best be described by first presenting a chronology of the development of these curricula, and then by giving examples of their components. Like those in language development and reading, the mathematics and science curricula have utilized both programs and materials that have been developed and published commercially for use by children from the preschool years through elementary grades, and materials and teaching methods that have been devised by the Institute's staff, specifically for use in its program.

Development of the Institute's mathematics curriculum began when the enrichment program still included only the two preschool years. Children in the preschool classes used prepared materials from such coordinated programs as the Rasmussen Math Lab Kits, the Stern Structural Kits, and the Cuisenaire Rods. These materials were later used, where appropriate, in other grades of the Institute's longitudinal program. Also, a Math Manual was developed in order to assist the teachers in their presentation of mathematical skills and concepts.

As the enrichment program expanded into the grades, the Houghton-Mifflin Math Manual was introduced, providing additional structure to the program, and offering a supplementary teacher's guide that was used in conjunction with our own IDS Math Manual.

The other materials such as Cuisenaire Rods, Stern Structural materials, Rasmussen Math Lab materials, were all designed to give the child an understanding of basic mathematical concepts, as well as to help him develop proficiency in certain skills (adding, subtracting, multiplying, using fractions, etc.).

As this program evolved, the instruction of mathematics was coordinated with that of science. Mathematics could thus be used as a tool to carry out general operations of inquiry and to develop an understanding of scientific concepts; also, scientific methodology could be used to enhance the understanding and application of mathematics.

The Institute's combined mathematics-science curriculum emphasized a "process" approach. Basically, this means that the conceptual processes involved in learning specific facts, or in acquiring particular skills, were taught as an integral part of a total mathematics-science curriculum. For example, stress was placed on scientific method and inquiry (e.g., formulating and testing tentative hypotheses), as well as on the particular facts that were arrived at from use of such a method.

The format of all the materials that were used in connection with the mathematics-science curriculum is consistent with this basic "process" approach. The materials prepared by the American Association for the Advancement of Science (AAAS) provided the children with the opportunity to deal with a number of elemental processes necessary to the development of an understanding of scientific method and scientific phenomena. In the primary grades, children were introduced to such processes as observing, recording, measuring, predicting, using time-space relationships, etc.

Particularly in the early grades, science and mathematics content was interwoven throughout the curriculum in such activities as discussions of weather and seasons, time, growing classroom plants, caring for classroom animals, taking trips to the zoo, aquarium, etc.,; cooking, where such concepts as change of state with temperature are involved; using magnets and magnifying glasses; and in a myriad of ways that presented themselves throughout the day.

The mathematics-science program began at a simple, concrete and manipulative level. The child followed a step by step progression from this manipulative level to one that involved handling abstract and symbolic relationships. As has been described above, the concrete materials used at this first level included size and colored cones, unifix cubes, funnels, spoons, differently shaped and variously textured collage pieces, and the like.

The handling of these materials was designed to help the child make discriminations, handle classification tasks, make generalizations, and to develop an appreciation of such concepts as texture (rough-smooth), size (big-little), quantity (greater than-less than), similarity (same as-different from), etc. Children at the beginning level also learned to count and identify certain numerals (at prekindergarten, for example, at least from one to five).

On a somewhat more advanced and complex level, children were introduced to the concept of sets. Generally, this introduction took place in kindergarten, although it is in no way fixed at that year. At first, the children dealt with sets, concretely identifying and manipulating objects that could be associated in a set (all books, all crayons, all blocks, all pencils, etc.). The children then advanced to understanding concepts of different sets, unequal sets, and empty sets. After a child could appreciate the basic notion of "set", he then used the sets for various mathematical operations (such as addition, subtraction, multiplication, division). As mentioned before, children were taught early to recognize and write numerals. In the later segments of the Mathematics-Science curriculum, children used their knowledge of numerals to deal with symbolic relationships in the various arithmetic and algebraic operations that can be performed on sets.

After developing a basic orientation to mathematics, and an understanding of some of the basic concepts involved, children then applied their knowledge to problems of measurement. In this regard, children dealt with linear measurements, and temperature measurements. They also started exploring geometric concepts, beginning with the recognition and description of shapes, angles, and the like. Again, the progression was from the concrete to the abstract. A child might have begun early in the program by manipulating objects which differed in size; later he might have been asked to compare the heights of people, and then to go on to using units of linear measurement as represented on a ruler or yardstick.

In the grades, this basic understanding was then applied to other types of measurements, as well as to various mathematical operations. Children worked with measuring forces with springs, ordering plane geometric figures by areas, plotting coordinates, interpreting graph data, etc. Moreover, these latter two applications of the basic concepts of measurement were then used in various activities involving scientific experimentation (e.g., plotting the temperature rise in an experiment and interpreting the graph produced), thus appropriately combining science and mathematics curriculum elements.

All the prepared materials that were described above were used along with mathematics games and guidelines that were developed for all grade levels of the IDS program. These Institute-developed materials were used as supplementary in those areas covered by the prepared materials, and were used as well as resource materials for areas not covered.[4]

## Creative Dramatics - Prekindergarten through Third Grade

Creative dramatics, or guided dramatic play, was introduced as part of the Institute's overall curriculum early in 1966, under the supervision of a specialist in this field. Particular emphasis was placed on the use of creative dramatics as a method to vitalize curriculum skills of the children, to teach inference-making and problem solving, and to develop imaginative thinking.

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[4] Daily logs of mathematics-science activities, kept by IDS teachers, may be found in Appendix III to this report.

Because creative dramatics was improvised (i.e., the participant made up the dialogue and action as he played, and immediately tested his inferences within the context or the playing and plot) the children were highly motivated to question, to test alternative hypotheses, and to examine the dimensions of human behavior and experience. Since the medium was oral communication within the context of action, children who participated were directly engaged in utilizing a wide range of cognitive and communication skills--vocabulary, language, patterning, inflection, sequence, clarity, etc.

In developing the creative dramatics program the specialist worked with Institute supervisors to review curriculum areas and particular grade level problems, and observed classes in progress to note areas in which creative dramatics might be profitably used as a teaching approach. She then worked with children for several weeks, as well as with the teachers and assistant teachers who observed and participated in the dramatic play. Consultations between specialist and individual teachers were held to discuss the approach, the children's responses, and to plan the teacher's first use of this method, and its further elaboration in their classrooms.

One of the major emphasis of this program was to add the tool of guided dramatic play to the teacher's repertoire of skills at all grade levels, and also to help the teacher use it as a method of teaching content in the various curriculum areas.

A pantomime unit and a number of dramatic improvisation games were pilot tested, revised, and made part of the curriculum in the grades. The pantomime unit was introduced to the children first, as it was action-oriented rather than verbal. The skills learned in the pantomime unit were to be used later in the dramatic improvisation games.

Teachers have observed that the program in creative dramatics helped to improve the children's attention span, question-asking behavior, and the quality of their expressive language. Unfortunately, when funding for curriculum development was reduced, progress in the creative dramatics area was severly curtailed.

### In-Service Training

The efficacy of all facets of the IDS classroom program was related to the success of the continuous in-service training of all professional staff. Teachers, assistant teachers, supervisors, curriculum specialists, and the curriculum director met to engage in special training workshops, as well as to discuss common problems and develop new curriculum materials and relevant educational strategies.

This in-service training provided an essential feedback function, calling for the constant review of the effectiveness of classroom materials and teaching methods. It also established a forum for ongoing analysis of the characteristics and effectiveness of individual teachers, teams of teachers, and their classrooms. Such constant review and analysis was critical to the dynamism of a program, and to insuring its continuing relevance and effectiveness.

The primary goals of the in-service training program included:

1. sensitizing teachers to the abilities and needs of children from socioeconomically disadvantaged backgrounds;
2. helping teachers re-examine their own values, stereotypes, and possible prejudices;
3. training teachers in the rationale, content, and methods of the Institute's enrichment program;
4. involving teachers in the process of curriculum innovation and of implementing these changes; and
5. providing clear delineation of the role of the assistant teacher in the classroom.

An essential element in achieving these objectives was simply providing time for training to take place. Since prekindergarten and kindergarten teachers had morning classes, only their afternoons offered extended periods of time for workshops, training sessions, and conferences with supervisors. First, second, and third-grade teachers had classes until 3:00 P.M., a fact which made it more difficult for them to participate in activities related to in-service training.

The process of sensitizing teachers was accomplished in a number of ways. Institute research staff reported and discussed with teachers their own findings, as well as findings of others working in this field. The social service staff contributed its knowledge about the home environments of the children and helped teachers to understand how this environment could affect children's motivations and school performance. Also, teachers were familiarized with the variety of social services that were available to the children and their families, so that they could make appropriate referrals as the need arose.

A major aspect of in-service training was educating teachers about the rationale, goals, content, and methods of the Institute's enrichment program. For new prekindergarten teachers, there was an intensive three-week orientation period before classes began. Throughout the year, generally on a twice-a-week basis, all teachers attended workshops and seminars conducted by various Institute staff members, outside speakers, and consultants to the Institute.

When the seminar topics involved curriculum content, methods and materials, the leaders of the workshops relied heavily on live demonstrations with children. In most cases, the Institute's supervisors and consultants acted as workshop leaders in order to apply their overview of the program to the integration and articulation of the curriculum components being demonstrated. Curriculum specialists, supervisors, and teachers worked together to follow the curriculum innovations into the classroom, and to make appropriate revisions and modifications before they were made part of the Institute's enrichment program.

Perhaps one of the strongest elements of the Institute's in-service training program was the direct supervision of the classroom teachers by the supervisor. The high degree of both quality and quantity of supervisionwas made possible through low teacher-supervisor ratios. (Generally, each supervisor was responsible for the staff of no more than six classrooms.) Because therewas one supervisor in each of the schools housing the IDS classrooms, the supervisorswere able to observe the teachers in action regularly and frequently, and to follow each of the observations with a conference to single out and reinforce particularly effective activities, as well as to work out whatever problems they may have detected.

As the teachers became familiar with the goals and practices of the Institute's enrichment program, they were encouraged to participate in the actual implementation and evaluation of curriculum and to become innovators of curriculum themselves. To the researcher and curriculum specialist, the teacher, with her knowledge of, and experience with, children, was an invaluable ally in the development, implementation, and evaluation of new curriculum components. IDS teachers, for example, played an important role in devising games to reinforce reading and mathematics skills, preparing tapes and cards for use in the Listening Center and with the Language Master, reporting on the effectiveness of new programs, and supplying ideas for appropriate revisions and modifications of curriculum. The involvement of teachers in the process of translating research into practice was a potent training strategy, as well as an effective means of accomplishing the translation.

In many enrichment programs, the part assistant teachers play in classroom procedures is nebulous and haphazard. The effort to delineate the role of the assistant teacher and to develop productive working relationships in the classroom was one focus of the in-service training program. In order to accomplish this, observations were made by selected Institute staff at the beginning of the year, and these observations were used by supervisors to devise ways in which assistants could work more effectively.

In many instances, previously unlicensed assistant teachers have gone on to receive licenses and to become head teachers in the Institute's demonstration classes or in other programs.

## Parent Program

One of the essential features of the total IDS program was the plan for parent involvement. This plan grew out of our original commitment to the IDS parents--one that went beyond offering experiences to their children in the enrichment classrooms. The parent program was established with a view to increasing the continuity between home life and school life for the child. Minimal continuity between home and school is a fairly typical feature for children in low income areas.

To this end, the Institute explored several avenues for involving parents in their child's formal educational experiences, and for involving the Institute's staff in the broader context of the child's life outside of school. A team of social workers, community aides, and educational specialists worked together to establish a Parent Center, and to create a program providing for meaningful parent involvement and open communication between parent and teacher.

The activities of the parent program fell into three major categories:

(1.) activities that centered around the classroom and educational materials;
(2.) those that involved the relationship between parent and teacher; and
(3.) those that revolved around the life problems common to many of the families involved in the program.

Each of these activities will be discussed briefly below.

A major effort was made to familiarize parents with the activities of the classroom and with the classroom materials. Parents were encouraged to visit the classroom and observe their child as he worked and interacted with his teachers and classmates in this setting. Training sessions were held to further acquaint parents with the classroom materials and to discuss and demonstrate curriculum elements that could properly be used at home to enhance the child's learning. For instance, parents constructed some of the games (such as number sorting games and boxes with items whose names sound alike) that their children were working with in school and/or that could be used at home. This provided familiarity for the parent with the game, and also provided materials for the child to use at home.

In these parent training sessions, some of the different uses of classroom materials were demonstrated, and some of the reasons underlying the choice of different pedagogical techniques and choice of materials were explained and discussed.

For example, in one session parents were shown how finger painting could be important to the child's muscular development (particularly those muscles of the hands, arms, and fingers that would later be used in writing), as well as to his free expression. At one session, parents were given a demonstration of a teacher reading a story to a child, and this was followed by discussions and role-playing activities to help them explore the various learning experiences that could be related to reading a story to a child.

In addition to classroom observations and the training sessions described above, the attempt to establish good parent-teacher relationships included home visits by the teachers and assistant teachers. These visits helped to establish a positive relationship and open communication between parent and teacher, while helping the teachers learn more about the child in the context of his home setting. Moreover, for the prekindergartners, teachers' visits also eased the initial adjustment to school. The home visits made by the prekindergarten teachers helped them to decide the time that a particular child was to be phased into the program (as discussed earlier in the discussion of the prekindergarten and kindergarten program).

A central meeting place for parents and Institute staff was provided when the Parent Center was established in 1966. The Center was housed in the neighborhood settlement house of a local church. This center was used by parents for a number of different activities including: club meetings (e.g., for the sewing club or the knitting club); sessions to work with classroom materials; discussions with the Social Work Director and her staff (social workers, community aides, and educational specialists) about common problems such as housing, nutrition, safety, etc.; and planning for common activities (such as the Third Grade commencement party, book fairs, workshops on black heritage, welfare rights, consumer buying, legal aid for the poor, etc.).

In addition to such activities, the Institute has been able to provide various social services for the families of children in the program. The social work staff, for example, has helped to expedite problems that related to housing and welfare; when indicated, community aides have escorted parents to the appropriate community agency and helped them handle the procedures there. Community aides also escorted the preschool children to school if they were not able to attend otherwise.

In addition to these active and specific problem oriented services, a clothes bank was established at the Parent Center, from which parents could draw if they needed and wanted to. The clothes bank had direct impact on the classroom program, in that it helped to cut down a substantial portion of absenteeism attributable to the lack of adequate clothing available for the children to wear to school.

Although the above discussion has described the parent program as it operated through the time period covered in this report, two additional features of the current program will be mentioned. In 1968, a Home Instructional Program was piloted. This program provided training for parents whose third grade children were falling behind in reading. After training sessions with members of the Institute staff, parents worked with children at home to help them overcome their reading difficulties. This plan was subsequently modified when it appeared that tutoring could not always be carried out by the parent in the home. In some instances, other tutors were provided to work with the child outside his home. Parent involvement in this program therefore ranged from tutoring the child in the home or elsewhere, to observing the other tutor work with the child, to simply being informed about the nature of the tutoring activities. In addition, efforts were made to encourage the cooperating schools (those in which the Institute's classes operated) to implement certain aspects of the Institute's Parent Program. These efforts were designed to broaden the base of impact of the IDS program and to establish programs that would then involve the total community.

## Extramural Training

Although the Extramural Training component of the IDS program has only tangentially influenced the results described in this monograph, a brief description of this component will be given. More detailed information is available in The Final Report to the Office of Economic Opportunity (OEO Contract #2425).

Requests for training in all aspects of early childhood education came to the Institute from all parts of the United States. The Institute's demonstration classes, equipped with one-way vision walls were observed by thousands of early childhood educators. The Institute's training staff has guided these observations, helping to orient and train those who came to the Institute. Moreover, information about the IDS program and reports of Institute research have been sent in response to continual requests from interested educators, psychologists, and other behavioral scientists.

Members of the Institute's training staff conducted workshops and led discussions for the interested visitors who came to observe the program. In addition, they worked with personnel in many communities throughout the United States, providing guidance for those who wished to follow the Institute's model in establishing their own programs.

For the past five years (1965-1970), the Institute training staff has worked with rural and urban Head Start groups, concentrating on local program and staff development. The training staff has worked also with a wide spectrum of educators (including administrators, supervisors, teachers, and paraprofessionals), lecturing and giving workshops in the many communities they worked with, as well as guiding those who came to the Institute itself.

## METHODS, (CONTINUED)

### Evaluation Procedure

#### Subjects

The children involved in this program (the experimental and control subjects) were black, of both sexes, aged four to nine. They were drawn from sections of an inner city, "ghetto" area of a large northeastern city.[1]

#### Sample Selection

As the program became established, an increasing number of parents volunteered their children for it. However, particularly in the early stages of the program's operation, it was also necessary to conduct active recruiting in the community. Staff members obtained the names of children from a variety of sources: from church groups, from response to posters, from word-of-mouth information, from other children, from teachers and principals, etc. Minimal demands were then made on the parent(s), who were asked to respond to a short interview given in their home and to bring their child to the school for a short observational period.

A final sample was chosen from the group that had been gathered through these recruitment procedures. The children selected met the following criteria:

1. The child met New York City age requirements for admission to public school kindergarten in September of the following year.
2. The parent was prepared to assume responsibility for bringing the child to school.[2]
3. The child and parents were English speaking.
4. The child was in generally good physical condition. He or she had no serious orthopedic difficulties, or obvious abnormalities in hearing or vision.
5. The child had no serious emotional disturbances or behavior problems that could be detected at the time of observation.
6. The child was in the low socioeconomic (SES) classification, as defined by the Institute's SES Scale. (This scale uses the amount of education and the occupational status of the family's chief breadwinner as its criteria for SES classification. A copy of the scale is in the appendix.)

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1. Other populations were used at various times, but longitudinal data are not available for the other groups, and hence they were not included in this report.
2. With the advent of funding programs for community and school aides, this requirement was eliminated.

Classification of children with regard to SES was particularly important in the early years of the program's operation. In the later years, it seemed unnecessary to continue this rigid classification procedure, as it is known that the school districts involved are composed almost entirely of lower SES persons. In addition, the Institute assumed the responsibility for enrolling younger siblings of those children already in the program; thus, some of the famililies who volunteered for the program in the later years had already been checked for SES classification.

### Formation of Control Groups

Approximately one third of the children selected by the above criteria could not be handled by the small number of Institute classrooms, and these children, chosen randomly from the total N, constituted a control group. Since this group was equivalent to the experimental group in parental motivation and desire for the child to be part of an enrichment program, it was designated the control group for the factor of self selection, and is referred to subsequently in this report as the Css group. The experimental group was given enriched schooling from prekindergarten through the third grade, while the Css group first encountered formal schooling in the regular kindergartens (or, in some cases, first grades) of the New York City public school system. (Although most Css children began school at kindergarten, this was not stipulated as a requirement when the group was originally formed.)

In order to provide further controls for the IDS program, two additional control groups were constituted, one at the beginning of each of the next two successive years. The first was the "kindergarten control" or Ck group. This was composed of children who had no prekindergarten training and who entered the kindergartens of the same public schools that the E and Css groups attended.[3] When the Ck group was selected, of course, the E and Css groups were also entering kindergarten. Apart from the time of their selection, the children in this group differed from those in the Css group primarily in that they were not recruited nor had they volunteered for the Institute's program. The second additional control group was constituted at the beginning of the following school year, and included children who entered the same public schools as the other groups at the first grade level. They had no prekindergarten and no kindergarten experience (see footnote 3, below).

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3. In the later years of the program, Head Start was in full swing, and, to obtain a sufficient number of children for the Ck group, it was necessary to include children who had been in the Head Start program. Their inclusion, of course, would have the effect of minimizing E vs. Ck differences, and thus was an experimentally conservative choice.

### Waves

The first wave of children was admitted to IDS prekindergarten classes in January of 1963.[4] Starting in September of 1963, and in each successive fall, a new group or "wave" of children began the IDS program at the prekindergarten level. Thus, at the present time (1970), the first waves of children have completed five years of enrichment (through grade three) and the fourth wave of children has completed four years of enrichment (through grade two). Except where otherwise noted, the first four waves of children are included in the evaluation presented in this report.

The numbers of children available for evaluation in any one year varied for a number of reasons. While each Institute prekindergarten classroom began with seventeen children because of varying of funding the number of prekindergartens operating changed from year to year.

In addition, within any one wave, more than one-half of the children dropped out between the beginning of prekindergarten and the end of third grade. (Geographic mobility of inner city, ghetto populations is typically found to be this high or higher--see Goldberg, 1967.) The drop-outs from the experimental group were replaced by other children who were chosen from the regular school classes by non-Institute school personnel, to fulfill the class size requirement of the Board of Education (in Kindergarten, for example, class size had to be 25, in first grade, 30). These children are called "fillers," and some were added each year. Data were gathered on these children, but the scores have not been included in the analyses presented in this report, as the fillers were not strictly comparable to experimental or control children.[5]

The number of children in the control groups was limited not only by attrition due to geographic mobility, but also by the difficulty involved in obtaining the parental permission needed to test each child; and the occasional selection from the control sample of a "filler" child who then entered an experimental class.

### School Setting

The Institute's classes were housed in several of the regular public schools in Manhattan, including the Lower East Side, the Upper West Side, Central Harlem, and East Harlem. The children whose test scores are reported in this report have attended the Institute's classes in Central and East Harlem.

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[4] Children in the first wave were enrolled and pretested in the fall of 1962. As time was necessary for planning and further organization of the program, actual prekindergarten classes did not begin until January of 1963.

[5] Filler children tended to score higher on ability measures than either the norm for the school or for the E group.

Each of the host schools had several Institute and several non-Institute classrooms on each grade level. The prekindergarten level was an exception to this in that, for the time period covered in this report, the New York City Board of Education did not sponsor regular prekindergartens in these schools.

The relationship between the Institute and the schools has been affected by the high turnover rate of the schools' regular supervisroy and teaching personnel. Furthermore, over the years, the relationships among the Institute, the various schools, and people of the communities, changed a great deal. Many people in the Harlem community first reacted to the IDS program with suspicion and a certain amount of hostility. This may have been attributable to their view of the Institute's program as "just one more short-lived program that experimented with black children." Initially, teachers in the schools also regarded this program with hostility and suspicion. For them, this may have been a result of the fact that, at first, the Institute tried to operate in isolation from the rest of the school, discouraging communication which would result in the diffusion of experimental curricula to non-experimental classrooms (and the contamination of control groups). Both community and teacher's reactions were subsequently modified, as the Institute's program became more established and as the interactions between Institute and non-Institute staff increased. As will be discussed below, a conscious effort was made later to extend the impact of the Institute's program to involve those in non-Institute classes.[6]

The United Federation of Teachers' strikes of 1967 and 1968 also had an impact on the Institute's program and on the communities in which it operated. The strikes resulted in, among other things, a great deal of administrative confusion within the individual schools. Tension developed between the communities and the schools, as well as among the staff members of individual schools. Institute teachers, and many of their colleagues in inner city schools, did not support the strikes. Despite this fact, the tensions and confusion associated with them (both in the schools and the communities) affected the children in, and the operation of, the IDS program.

### Community Setting

Harlem is too diverse a community to describe simply or to characterize as one unit. In general, the Institute's staff has found that the families involved in this program live in conditions of economic deprivation; in crowded and unsafe housing; in an area characterized by high drug addiction rates, high crime rates, low employment rates, and inadequate health facilities.

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[6] These efforts were undertaken despite the fact that they would result in diffusion. The Institute's concern, of necessity, was primarily with service to the schools and communities in which it operated, and only secondarily with the strictness of experimental design.

The community in which the Institute operated was marked by a heightened awareness of political, social, and educational issues that were related to the educational welfare of children. Furthermore, in the time period covered by this report, the Harlem community was a focal point for the "Black Liberation Movement." Particularly in the late 1960s, the people in the Harlem community began to demand increased control over their own institutions and destinies. To cite just one relevant example, one of the schools in which the Institute's classes were housed was part of a demonstration district that was set up as an experiment in community control.[7]

## Description of Assessment Instruments-General Plan

Both experimental and control children were given a number of tests of ability and achievement, the limitations of which will be discussed below. These tests were given by Institute personnel who were trained and experienced in test administration. Children within experimental and control groups, and from the various schools were randomly assigned to testers, so each tester administered measures to subjects from all groups. It was not possible to vary systematically the race and sex of testers, because at the time the evaluation began, qualified black testers were too few in number in the New York area. As indicated in the test description below, most measures were individually administered, though several were given in small groups. The sole exception to this procedure was in the administration of the Metropolitan Achievement Tests: these were given to groups of children by the classroom teacher or the grade supervisor.

In general, there were six testing periods (pre-prekindergarten, post-prekindergarten, post kindergarten, post first grade, post second grade, and post third grade), with the pre-prekindergarten testing being done in the fall, and the other periods occurring in the spring of each year. It should be noted, however, that the Ck and the $C_1$ groups received initial tests at the beginning of kindergarten and of first grade respectively, in the fall.[8]

In order to control for possible test experience effects on post test results, only half the E and Css children of the first wave (randomly chosen) were pretested on the Stanford-Binet Intelligence Scale (Form L-M) and the Peabody Picture Vocabularly Test. Since no such effects were found on either test, pretests were administered to all children of subsequent waves.[9]

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[7] The degree of control actually accorded to the communities in these experiments is however, equivocal; the degree to which they have affected the quality of education has not been clearly established. For further discussion, see Wilson, 1969.

[8] Obviously, these control groups by definition could not be selected until the fall. However, their test results are compared with the spring testing for the previous grades.

A summary of tests and testing periods for four waves of children appears in Table 1.

### Intelligence Tests

Stanford-Binet (S-B): The Stanford-Binet Intelligence Scale (Form L-M - 1960) was administered to experimental and control children at the following testing periods: pre-prekindergarten, post-prekindergarten, post kindergarten, and post third grade. The manual of the 1960 revision of the Stanford-Binet reports that the test measures "general intellectual ability." Evidence of the validity of the 1960 version rests only on the selection of items from the 1937 version. Items retained showed an increase in percentage of persons passing the item with an increase in age; they correlated well with the test as a whole. The manual does not report re-standardization with the 1960 version, nor does it give test-retest reliability. However, the IDS sample has been used to obtain stability coefficients, these being .72 for the E group (N=161) and .62 for the Css group (N=44) between the pre-prekindergarten and post-prekindergarten testing periods; and .72 for the E group (N=161) and .74 for the Css group (N=44) between the post-prekindergarten and post kindergarten testing periods.

Lorge-Thorndike (L-T): The Lorge-Thorndike Intelligence Tests (Level 1 - non-verbal battery) were administered to first and second grade children in the spring of each year. It was used instead of the Stanford-Binet at first and second grade in order to avoid a practice effect on the Binet. The Lorge-Thorndike is easily administered as it is a group test. For this research it was given to small groups of 15 children at a time, by two examiners. It is designed to measure "abstract" intelligence and, at the two lowest levels (from approximately kindergarten to third grade), only non-verbal items (pictures of familiar objects or simple geometrical figures) are used. Standardization has been carried out in 44 states of this country. It is one of the few tests that has a standardization population consisting of persons on varying socioeconomic levels. Reliability coefficients greater than .76 (as high as .90) have been obtained by estimating the correlation between Forms A and B of the test. Validation studies have employed correlations with achievement and intelligence tests, as well as with measures of later academic success (Freeman, 1959).

### Language Development Measures

The Peabody Picture Vocabularly Test (PPVT): The PPVT is an individually administered test and was used at the same testing points as the Stanford-Binet. The test can be considered one of

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[9] See Deutsch and Goldstein (1967a) and Deutsch and Goldstein (1967b).

## Table 1

## EVALUATION SCHEDULE - FIRST FOUR WAVES

|  | Time of Testing |  |  |  |  |  |
|---|---|---|---|---|---|---|
| Group | Pre-prekindergarten | Post-prekindergarten (or Beginning of Prekindergarten) | Post-kindergarten (or Pre-First Grade) | Post-First Grade | Post-Second Grade | Post-Third Grade |
| E group | S-B<br>PPVT | S-B<br>PPVT | S-B<br>PPVT<br>RPT | L-T | L-T<br>MATS (Reading Subtests) | S-B<br>PPVT<br>MATS (Reading & Arithmetic Subtests) |
| Css group | S-B<br>PPVT | S-B<br>PPVT | S-B<br>PPVT<br>RPT | L-T | L-T<br>MATS (Reading Subtests) | S-B<br>PPVT<br>MATS (Reading & Arithmetic Subtests) |
| Ck group |  | S-B<br>PPVT | S-B<br>PPVT<br>RPT | L-T | L-T<br>MATS (Reading Subtests) | S-B<br>PPVT<br>MATS (Reading & Arithmetic Subtests) |
| $C_1$ group |  |  | S-B<br>PPVT<br>RPT | L-T | L-T<br>MATS (Reading Subtests) | S-B<br>PPVT<br>MATS (Reading & Arithmetic Subtests) |

**Legend:**

S-B - Stanford-Binet Intelligence Scale (Form L-M)
PPVT - Peabody Picture Vocabulary Test
RPT - Reading Prognosis Test
L-T - The Lorge-Thorndike Intelligence Tests Level 1 - Nonverbal Battery
MATS - Metropolitan Achievement Tests

receptive vocabulary. The child is asked to point to one of four pictures that represents the objects or activities named. The manual reports that alternate form reliability ranges from .67 to .84 depending on age level (Dunn, 1959). Stability correlations have been obtained for the IDS sample between post-prekindergarten and post kindergarten. These correlations were .63 and .67 for the E (N=160) and Css (N=52) groups respectively. Standardization of this test was based only on a sample of children with varying IQs in and around Nashville, Tennessee; evidence of validity rests on correlations with various intelligence measures, e.g., high .70s and low .80s with the Weschler Intelligence Scale for Children test (Piers, 1965).

The Illinois Test of Psycholinguistic Abilities (ITPA): The ITPA assesses language development, and provides a diagnostic profile for each individual. The design of the subtests, each measuring a specific psycholinguistic ability, is based on a revision of Osgood's model of human language usage. Three major dimensions are postulated to specify a given psycholinguistic ability: level of organization, psycholinguistic process, and channel of communication. Briefly, these may be described as follows:

Level of organization: This refers to the functional complexity of the organism. (1) The representational level of organization is required to mediate activities which involve meaning or significance of linguistic symbols. (2) The automatic-sequential level of organization is required to mediate activities which involve retention of linguistic symbol sequences and the execution of automatic habit-chains.

Psycholinguistic process: This refers to the sets of habits required for normal language usage. (1) Decoding habits are required to obtain meaning from visual or auditory linguistic stimuli, (2) encoding habits are required for expression in words or gestures, and (3) association habits are required to manipulate linguistic symbols internally.

Channel of communication: This refers to the sensory-motor paths over which the linguistic symbols are received and responded to. Channels of communication are divided into mode of reception (auditory or visual) and mode of response (motor or vocal).

The 1961 version of the ITPA was individually administered to Wave 1 children at the first, second and third grade levels. All 9 subtests were used (representational level: auditory decoding; visual decoding; auditory-vocal association; visual-motor association; vocal encoding; motor encoding; automatic-sequential level: auditory-vocal automatic; auditory-vocal sequential; visual-motor sequential).

Test-retest reliabilities from .18 to .86 (median value 49.5) for the various subtests and .70 for the total test were obtained for one age group (6.0 to 6.6) (McCarthy & Kirk, 1963).

The 1968 version of ITPA was given to children in Waves 4 and 5 at second and third grade. Six of the 10 subtests were chosen in order to cover auditory and visual aspects at the representational and automatic levels. Criteria used in selection of the subtests were: applicability of the subtests; administration time; and kind of information tapped by the subtest. The 6 subtests used were: auditory reception; visual reception; auditory association; visual association; sound blending; and visual closure. Little reliability and validity information is available on this version of the ITPA.

## Reading Achievement

The Metropolitan Achievement Tests: The Metropolitan Achievement Tests are given to all elementary school children in grades 2 and above in the New York City school system. The test is given in the classroom, by the classroom teacher or grade supervisor; it is usually administered in the spring of each year. The Reading Subtest consists of 2 parts: Word Knowledge and Reading. Word Knowledge is essentially a vocabulary measure, and Reading is essentially a comprehensive measure. The Arithmetic Subtest also consists of 2 parts, these being Computation and Problem Solving.

At the discretion of the school, different children in the same grade may be given more or less difficult forms of the subtests. Thus, raw scores must be converted into "grade equivalent" scores, since only grade equivalent scores can place the variant forms in the same frame of reference. (A score of 3.4 means that a child is reading at the level of third grade, fourth month.) Robinson (1965) reports that reliability for each subtest is good (.79 to .96), and that a measure of validity has been obtained through careful study of curricula, judgement of experts, and repeated experimentation. Standardization has been carried out throughout 49 states in the United States.

Reading Prognosis Test: The Institute's Reading Prognosis Test was designed to tap skills that are involved in the reading process and was devised to predict success in reading. It consists of seven subtests, grouped in three areas as follows:
(1) Beginning Reading (Alphabet Letters, Sight Vocabulary):
(2) Perceptual Discrimination (Auditory Discrimination, Visual Similarities, Visual Discrimination); and (3) Language (Meaning, Vocabularly, Story Telling).

Validation studies of the Reading Prognosis Test have been done with both lower and middle class samples in the New York City vicinity. These studies have employed correlations with standardized reading test scores at the end of first grade. Predictive correlations obtained for the lowest SES group range from .60 to .82 (Weiner & Feldmann, 1963)

The Early Childhood Inventories: The Institute's Early Childhood Inventories[10] were devised to measure particular curriculum elements, and to tap specific skills. Inventories tapping the following skills areas were used: Alphabet Names (ANI); Numeral Names (NNI-1); Body Parts Names (BPNI); Shape Names (SNI); Relational Concepts (RCI/PM) and (RCI/PS)[11]; Quantity Matching (QMI); Set Matching (SMI) and Prepositions (PI).

The Early Childhood Inventories (ECI) were given at the end of kindergarten to all E and Ck children of Waves 5 and 6. Although the inventories were also administered at prekindergarten and at first grade, only measures taken at the end of kindergarten are included here, (Ck children were not available for prekindergarten testing and first grade scores for most of the inventories were relatively close to ceiling.)

Evidence of pretest equality can be cautiously inferred from that cited in previous waves' performance on the S-B and PPVT, where no significant pretest differences were found. Because of these limitations in using standardized instruments, which will be discussed later, a section on Qualitative Evaluation has been included in the Results section of this monograph. These evaluations were drawn from observations by and interviews with teachers, supervisors, school administrators, parents and observers. Unfortunately, the Institute was not funded for the kinds of extensive interviewing and observation that would have been necessary for a more inclusive evaluation. However, although limited, the statements obtained do form a very important part of the total assessment procedure and should be considered carefully in interpreting the data presented in this report.

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[10] The Early Childhood Inventories were developed by Jack Victor and Alan Coller, some of which have been used by the Stanford Research Institute's national evaluation of Head Start and Follow Through.

[11] Relational Concepts inventories include one dealing with pre-mathematics skills and one dealing with pre-science skills.

# FINDINGS AND ANALYSIS

## QUANTITATIVE EVALUATION

### General Analysis Procedures

In most cases, results were analyzed by two-way analyses of variance (Wave X Subject Group), despite the longitudinal nature of our evaluation. A repeated measures design with testing period as the repeated measure, was not employed. This decision was made because of the large attrition that took place in our sample. (As noted previously in the Procedure Section, attrition in this population is generally high.) In order to take advantage of the larger n's available at early test periods, separate analyses for each test period were performed. Approximately one third of the pretest sample for both E and Css groups remained at the end of the third grade.

Analyses of Variance tables will be summarized in the body of this report. Complete analysis of Variance tables will be reported in Appendix I.

Differences between subject groups were further investigated by means of orthogonal comparisons. At the post prekindergarten level (the pretest for the Ck group), comparisons of the E to the combined control groups (Css-Ck), and the control groups to one another (Css vs. Ck) were carried out. This latter comparison was dropped when the post prekindergarten similarity of the two groups had been established, and, at all further levels, the following three comparisons were used: (1) E vs. Css-Ck (i.e., E vs. control groups starting school at kindergarten); (2) $C_1$ vs. Css-Ck (i.e., controls starting school at kindergarten; (3) E vs. $C_1$ (i.e., E vs. controls starting school at first grade).

### Attrition Analysis

In order to determine if the character of the sample changed as a result of attrition, (i.e., whether the attrition was selective), an analysis was performed to compare the pretest scores (on S-B and PPVT IQ tests) of those children who had dropped out of the program at different points. The analyses were two-way, with the independent variables being Subject Group and Drop Out time (prior to end of pre-K, K, 1,2,3; no drop out).

Table 2 contains means, n's, and standard deviations of pretest S-B IQ scores for the E, Css, Ck and $C_1$ groups at each drop out time. The analyses of variance are reported in Tables A, B, and C of the appendix. The E and Css groups were analyzed by two-way analysis of variance (Drop out time vs. Subject Group). The Ck and $C_1$ groups were analyzed separately by one-way analyses of variance, since these groups were constituted at different grade levels, and therefore must be considered different from the E and Css groups, as well as from each other. No significant main effects or interactions were found in any of these analyses.

Table 3 contains the means, n's, and standard deviations of pretest Peabody Picture Vocabulary Test IQ scores for the E, Css, Ck and $C_1$ groups for each drop out time. The analyses of variance for the PPVT (two-way for E and Css groups, one-way for Ck and $C_1$ groups) are reported in Tables D, E, and F of the appendix. As was true for the Stanford-Binet, none of the PPVT analyses yielded any significant main or interaction effects. It was therefore concluded that attrition had no significant effect (as measured by comparison of pretest S-B and PPVT scores), on the nature of the subject groups. Since attrition did not bias the sample, it was possible to take advantage of the larger n's of the early testing periods and use all the subjects that were available for any given testing period.

## Pre and Post Test Results

The Stanford-Binet Intelligence Scale (S-B): As was described in the Procedure Section, the S-B was administered to the E and Css groups prior to and following prekindergarten, at the end of kindergarten, and at the end of the third grade. The Ck group was posttested following kindergarten and at the end of the third grade. Table 4 contains the means, n's, and standard deviations by Subject Group and Wave for the S-B IQ scores at each testing period. Analyses were always two-way (Wave X Subject Group). These analyses are summarized in Table 5. (See Tables G, H, I, J, K, and L in the appendix for complete Stanford-Binet Analysis of Variance tables).

Pre-Prekindergarten: A sample check was made to determine if any pretest differences existed between E and Css groups. Table 5 summarizes the 4x2 analysis of variance for E and Css pretest scores over four waves (See Appendix Table G) No Subject Group main effects were found; this finding was corroborated by the part of the attrition analysis that compared the E and Css pretest scores (see Appendix, Table A). However, wave effects were found for the S-B pre-prekindergarten analysis

Table 2

Means, n's, and Standard Deviations of the
Stanford-Binet Intelligence Scale IQ Scores
for the Attrition Analysis

| Dropout Time | Group | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | | | Css | | | Ck | | | $C_1$ | | |
| | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
| During Prekindergarten | 26 | 87.31 | 14.49 | 22 | 89.73 | 11.60 | | | | | | |
| During Kindergarten | 42 | 92.88 | 10.44 | 30 | 92.43 | 15.14 | 18 | 89.06 | 7.83 | | | |
| During First Grade | 19 | 96.53 | 10.46 | 9 | 94.44 | 12.67 | 30 | 91.50 | 11.85 | 16 | 78.19 | 12.34 |
| During Second Grade | 17 | 93.88 | 10.99 | 8 | 99.38 | 16.13 | 16 | 84.94 | 13.28 | 41 | 81.88 | 13.27 |
| During Third Grade | 17 | 95.47 | 10.34 | 4 | 88.25 | 25.12 | 12 | 94.17 | 10.45 | 27 | 84.67 | 13.04 |
| No Dropout | 66 | 93.33 | 11.29 | 20 | 91.65 | 12.58 | 48 | 91.88 | 12.41 | 68 | 86.47 | 12.73 |

## Table 3

Means, n's, and Standard Deviations of the Peabody Picture Vocabulary Test Scores for the Attrition Analysis

| | Group | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dropout Time | E | | | Css | | | Ck | | | $C_1$ | | |
| | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
| During Prekindergarten | 25 | 61.16 | 20.39 | 21 | 58.19 | 15.52 | | | | | | |
| During Kindergarten | 42 | 72.05 | 15.02 | 30 | 65.63 | 18.35 | 20 | 70.50 | 17.61 | | | |
| During First Grade | 19 | 69.32 | 13.75 | 9 | 66.33 | 14.08 | 46 | 73.43 | 19.80 | 16 | 67.81 | 17.73 |
| During Second Grade | 17 | 65.94 | 14.42 | 8 | 75.50 | 13.94 | 23 | 71.74 | 19.44 | 41 | 74.54 | 18.67 |
| During Third Grade | 18 | 66.89 | 11.80 | 4 | 79.00 | 32.07 | 14 | 75.36 | 15.29 | 27 | 75.67 | 17.60 |
| No Dropout | 65 | 70.52 | 17.01 | 23 | 65.74 | 12.99 | 61 | 73.93 | 19.46 | 67 | 77.57 | 20.11 |

Table 4

Means, n's, and Standard Deviations of the
Standford-Binet Intelligence Scale IQ Scores
for Each Group At Each Testing Period

| Wave | Group | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | | | Css | | | Ck | | | $C_1$ | | |
| | Pre-prekindergarten | | | | | | | | | | | |
| | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
| 1 | 31 | 96.19 | 11.62 | 15 | 95.53 | 14.89 | | | | | | |
| 2 | 70 | 93.07 | 11.27 | 34 | 92.94 | 12.57 | | | | | | |
| 3 | 88 | 91.63 | 11.53 | 48 | 90.31 | 14.54 | | | | | | |
| 4 | 86 | 91.28 | 12.63 | 32 | 89.25 | 12.73 | | | | | | |
| Total | 275 | 92.40 | 11.86 | 129 | 91.35 | 13.64 | | | | | | |
| | Post-prekindergarten | | | | | | | | | | | |
| 1 | 62 | 100.19 | 12.33 | 40 | 91.90 | 14.50 | | | | | | |
| 2 | 62 | 98.89 | 9.69 | 45 | 91.29 | 12.52 | 58 | 88.19 | 12.44 | | | |
| 3 | 67 | 100.76 | 10.76 | 34 | 92.76 | 11.41 | 66 | 92.91 | 10.73 | | | |
| 4 | 69 | 96.96 | 12.02 | 23 | 92.70 | 9.71 | 56 | 90.00 | 14.71 | | | |
| Total | 260 | 99.17 | 11.30 | 142 | 92.04 | 12.35 | 180 | 90.48 | 12.71 | | | |

Table 4 (con't)

| Wave | Group<br>E<br>N | $\bar{X}$ | S.D. | Css<br>N | $\bar{X}$ | S.D. | Ck<br>N | $\bar{X}$ | S.D. | $C_1$<br>N | $\bar{X}$ | S.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Post-kindergarten | | | | | | | | | | | | |
| 1 | 43 | 103.58 | 14.02 | 29 | 92.07 | 14.65 | 26 | 92.23 | 13.55 | 30 | 85.53 | 12.99 |
| 2 | 39 | 94.72 | 12.75 | 26 | 94.54 | 13.77 | 37 | 90.73 | 13.40 | 74 | 80.82 | 11.03 |
| 3 | 55 | 101.91 | 12.39 | 23 | 90.52 | 19.72 | 61 | 94.84 | 13.45 | 47 | 87.64 | 14.70 |
| 4 | 52 | 99.85 | 13.94 | 20 | 95.20 | 11.65 | 53 | 91.19 | 12.19 | 32 | 84.69 | 10.57 |
| Total | 189 | 100.24 | 13.54 | 98 | 93.00 | 15.13 | 177 | 92.50 | 13.09 | 183 | 84.02 | 12.54 |
| Third Grade | | | | | | | | | | | | |
| 1 | 32 | 97.63 | 12.78 | 12 | 93.92 | 11.62 | 13 | 94.00 | 11.90 | 17 | 94.29 | 14.69 |
| 2 | 21 | 91.76 | 14.92 | 13 | 91.23 | 13.26 | 19 | 86.32 | 10.87 | 26 | 84.81 | 14.18 |
| 3 | 29 | 99.28 | 12.31 | 12 | 93.58 | 16.22 | 30 | 93.43 | 15.33 | 20 | 90.65 | 12.10 |
| Total | 82 | 96.71 | 13.38 | 37 | 92.86 | 13.98 | 62 | 91.37 | 13.64 | 63 | 89.22 | 12.84 |

Table 5

Summary of Analyses of Variance of
Stanford-Binet Intelligence Scale IQ Scores
All Subject Groups At All Testing Periods

| Testing Period | Wave (A)<br>F | Subject Group (B)<br>F | AB<br>F |
|---|---|---|---|
| Pre-prekindergarten | 2.99* | $<1$ | $<1$ |
| Post-prekindergarten (4 Waves x 2 Subject Groups) | .51 | 31.82*** | .56 |
| Post-prekindergarten (3 Waves x 3 Subject Groups) | 2.15 | 20.52*** | $<1$ |
| Post-kindergarten | 2.02 | 31.52*** | 1.40 |
| Post Third Grade | 5.15** | 2.31 | 1 |

* $p<.05$ ** $p<.01$ *** $p<.0001$

($F=2.99$; $p<.05$). Inspection of the means for the S-B (Table 4) reveals that the means for the first two waves were higher than means for the third and fourth waves. Means for the first wave were especially high in contrast to other waves. No significant interaction effect was found.

Post-prekindergarten: Table 4 shows that, after one year, the mean of the E group on the S-B IQ test had increased from 92.40 to 99.17, while the control group mean changed only from 91.35 to 92.04.

For this particular testing period, two separate analyses of variance are reported: a 4x2 analysis for Css and E groups at postkindergarten over 4 waves; and a 3x3 analysis for Css, Ck and E groups in waves 2, 3, and 4. This latter analysis (leaving out wave 1) was done to include the Ck subjects who, for the first wave only, were not pretested.[1]

Table 5 summarizes the 4x2 analysis of variance as described above. The Subject Group main effect was highly significant ($F=31.82$; $p<.0001$). Unlike the pretest analysis, no significant wave effect was obtained. There also was no significant interaction effect. (See also Appendix I, Table H.)

Table 5 also summarizes the 3x3 analysis of variance for Css, Ck and E groups across three waves. The results of the 3x3 analysis were essentially the same as the 4x2 analysis (Table 5): a highly significant Subject Group main effect, ($F=20.52$; $p<.0001$), no significant wave effect, and a significant interaction effect. (Appendix I, Table I.)

Orthogonal comparisons were made with the subject group means (See Table 6). While the E group scored significantly higher than the Css and Ck group ($p<.05$), the control groups did not differ from one another. This again supports the assumption that the Css and Ck groups are derived from the same population.

Post kindergarten: Inspection of the Table of Means (Table 4) shows that, while the E group mean is 100.24, the means for Css, Ck and $C_1$ groups are 93.00, 92.50, and 84.02 respectively.

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[1] It will be remembered that the Css and Ck groups' post-prekindergarten testing actually took place at the beginning of kindergarten in September, while the E group was tested at the end of the prekindergarten year in May.

Table 6

Orthogonal Comparison of All Subject Groups
For Stanford-Binet Intelligence Scale IQ Scores

| Test Period | Ho: Css=Ck<br>F | <br>Conclusion | Ho: E=Css+Ck<br>F | <br>Conclusion | <br>F | <br>Conclusion |
|---|---|---|---|---|---|---|
| Post Prekindergarten | 1.60 | Css=Ck | 4.62* | E>Css+Ck | | |
| | Ho: $C_1$=Css+Ck | | Ho: E=Css+Ck | | Ho: E=$C_1$ | |
| Postkindergarten | 39.08** | $C_1$>Css+Ck | 34.58** | E >Css+Ck | 142.08** | E>$C_1$ |
| Post Third Grade | 1.83 | $C_1$=Css+Ck | 4.30* | E>Css+Ck | 8.18** | E>$C_1$ |

* $p<.05$ ** $p< .01$

Table 5 summarizes the 4x4 analysis of variance of S-B IQ scores for the E, Css, Ck and $C_1$ groups.[2] Only the Subject Group main effect was significant ($F=31.52$; $p < .0001$). Orthogonal comparisons (Table 6) showed that the E group scored significantly higher than the combined Css-Ck group ($p < .01$), as well as higher than the $C_1$ group ($p < .01$). The combined Css-Ck group scored significantly higher than the $C_1$ group ($p < .01$). (Appendix I, Table J.)

Post Third Grade: Table 5 summarizes the 3x4 analysis of variance of post third grade scores for E, Css, Ck and $C_1$ groups over waves 1-3. (See Appendix I, Table K.)

Wave was found to be a significant main effect ($F=5.15$; $p < .01$) The wave effect seemed to be primarily a result of the relatively low performance of the second wave. (See Table 4)

Subject Group did not reach the $p < .05$ level of significance ($F=2.31$; $p < .08$). Following Winer's suggestion (1962), however, orthogonal comparisons were nevertheless applied to the subject group differences (Table 6). The E group scored significantly higher than the $C_1$ group.

The Peabody Picture Vocabulary Test (PPVT): The PPVT was administered to the same subject groups at the same test periods as the S-B. Table 7 contains the means and standard deviations by Subject Group and Wave for the PPVT IQ scores at each test period. Again, two-way analyses of variance (Wave x Subject Group) were used. These analyses are summarized in Table 8, and completely reported in Appendix I, Tables L, M, N, and O.

Pre-prekindergarten: Table 7 summarizes the 4x2 analysis of variance for the E and Css groups at pretest. No significant subject group differences are apparent. The PPVT attrition analysis (Table 3) corroborated the fact that no significant differences existed between the Css and E groups at pretest on this measure. (Appendix I, Table O.)

However, as was true for the S-B, a wave effect was found ($F=4.17$; $p < .01$). Again, inspection of the means (Table 7) showed that the means for the first two waves were higher than those for the third and fourth waves; means for the first wave were again found to be especially high in contrast to other waves.

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[2] $C_1$ pretest scores were considered as comparable to E, Css, and Ck postkindergarten scores.

Table 7

Mean PPVT IQ Scores
At Each Administration

| Wave | Group | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | | | Css | | | Ck | | | $C_1$ | | |
| | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
| | Pre-prekindergarten | | | | | | | | | | | |
| 1 | 32 | 75.16 | 16.08 | 16 | 70.44 | 18.13 | | | | | | |
| 2 | 69 | 68.73 | 16.24 | 32 | 67.72 | 17.95 | | | | | | |
| 3 | 87 | 66.87 | 14.02 | 50 | 62.64 | 13.73 | | | | | | |
| 4 | 84 | 66.81 | 13.86 | 30 | 64.93 | 13.56 | | | | | | |
| Total | 275 | 67.55 | 14.97 | 128 | 65.46 | 15.48 | | | | | | |
| | Post-prekindergarten | | | | | | | | | | | |
| 1 | 62 | 85.85 | 17.95 | 40 | 75.25 | 17.95 | 39 | 76.08 | 17.35 | | | |
| 2 | 63 | 81.46 | 18.91 | 47 | 71.77 | 20.57 | 57 | 69.09 | 20.48 | | | |
| 3 | 69 | 81.41 | 17.55 | 35 | 68.51 | 16.69 | 70 | 75.06 | 17.70 | | | |
| 4 | 71 | 78.45 | 20.22 | 23 | 74.52 | 16.74 | 56 | 71.55 | 19.41 | | | |
| Total | 265 | 81.67 | 18.80 | 145 | 72.38 | 18.38 | 222 | 72.13 | 19.18 | | | |

Table 7 (con't)

| Wave | Group |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | E |  |  | Css |  |  | Ck |  |  | $C_1$ |  |  |
|  | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
|  |  |  |  |  | Post-kindergarten |  |  |  |  |  |  |  |
| 1 | 43 | 90.35 | 15.67 | 33 | 83.36 | 18.16 | 34 | 87.38 | 14.75 | 30 | 77.77 | 17.94 |
| 2 | 38 | 88.66 | 17.05 | 26 | 84.15 | 17.56 | 38 | 78.82 | 20.49 | 73 | 73.37 | 18.70 |
| 3 | 55 | 87.25 | 13.83 | 25 | 74.84 | 22.34 | 62 | 82.89 | 17.27 | 47 | 76.62 | 20.51 |
| 4 | 52 | 87.19 | 16.85 | 20 | 80.50 | 14.26 | 53 | 76.47 | 17.08 | 31 | 68.06 | 18.52 |
| Total | 188 | 87.76 | 15.72 | 104 | 80.96 | 18.55 | 187 | 81.06 | 17.80 | 181 | 74.03 | 19.15 |
|  |  |  |  |  |  | Third Grade |  |  |  |  |  |  |
| 1 | 31 | 90.39 | 12.88 | 12 | 86.25 | 17.71 | 13 | 86.15 | 10.55 | 17 | 84.71 | 14.33 |
| 2 | 21 | 90.95 | 12.68 | 13 | 84.15 | 14.55 | 21 | 89.19 | 14.37 | 25 | 83.28 | 14.37 |
| 3 | 30 | 96.40 | 14.40 | 13 | 84.92 | 9.39 | 30 | 94.07 | 17.72 | 22 | 87.91 | 18.67 |
| Total | 82 | 92.73 | 13.56 | 38 | 85.08 | 13.83 | 64 | 90.86 | 15.55 | 64 | 85.25 | 15.78 |

Post-prekindergarten Table 7 shows that after one year of enrichment the E group mean was 81.67 and the means for the Css, Ck groups were 72.38 and 72.82 respectively.

Table 8 summarizes the 4x3 analysis of variance of the post-prekindergarten PPVT scores for E, Css, and Ck groups (see footnote 1) in waves 1-4. Subject Group was found to be the only significant effect ($F=14.83$; $p < .0001$). (Appendix I, Table M)

Orthogonal comparisons of the subject group means (Table 9) showed that the E group scored significantly higher than the combined Css-Ck group ($p < .01$). As in the Stanford-Binet the Css and Ck groups did not differ from each other and therefore may be considered as derived from the same population.

Post Kindergarten: Table 7 shows that, after two years of enrichment, the E group mean on the PPVT was 87.76; the means for the Css, Ck and $C_1$ groups were 80.96, 81.06 and 74.03, respectively.

Table 8 summarizes the 4x4 analysis of variance of the post-kindergarten PPVT scores for E, Css, Ck and $C_1$ groups (see footnote 2) in waves 1-4. Again, the Subject Group main effect was significant ($F=16.33$; $p < .0001$). Wave was also found to be a significant main effect ($F=3.56$; $p < .05$). Examination of the PPVT means (Table 7) showed that, once again, the means for the first two waves were higher than those for the third and fourth waves; the first wave mean was especially high in comparison to the others. (Appendix I, Table N)

Orthogonal comparisons of the Subject Group means (Table 9) showed that the Subject Group main effect can be explained by the fact that the E group scored significantly higher than the Css-Ck groups combined ($p < .01$) as well as higher than the $C_1$ group ($p < .01$). The $C_1$ group scored significantly lower than the Css-Ck group ($p < .01$).

Post Third Grade: Table 7 shows that after five years of enrichment, the E group PPVT IQ mean was 92.73, while the means for the Css, Ck and $C_1$ groups were 85.08, 90.86 and 85.25, respectively.

Table 8 summarizes the 3x4 analysis of variance for the post third grade PPVT scores of E, Css, Ck and $C_1$ groups in waves 1-3. As in the previous analysis on the PPVT, the Subject Group main effect reached significance ($F=3.36$; $p < .05$). Orthogonal comparisons (Table 9) of the Subject Group means showed the difference to be entirely attributable to the superiority of the E group ($p < .05$). (Appendix I, Table O)

The Lorge-Thorndike Group Intelligence Test (L-T): The Lorge-Thorndike test was given to all subject groups at the end of first and second grades. Table 10 contains the means, n's, and standard deviations by subject group and wave for L-T IQ scores at first and

## Table 8

### Summary of Analyses of Variance of<br>Peabody Picture Vocabulary Test<br>All Subject Groups At All Testing Periods

| Testing Period | Wave (A)<br>F | Subject Group (B)<br>F | AB<br>F |
|---|---|---|---|
| Pre-prekindergarten | 4.17** | 2.87 | <1 |
| Post-prekindergarten | 2.04 | 14.83*** | <1 |
| Post-kindergarten | 3.59* | 16.33*** | 1.23 |
| Post Third Grade | 1.75 | 3.36* | <1 |

* $p < .05$    ** $p < .01$    *** $p < .0001$

## Table 9

### Orthogonal Comparison of Subject Groups For Peabody Picture Vocabulary Test Scores

| Test Period | F | Conclusion | F | Conclusion | F | Conclusion | |
|---|---|---|---|---|---|---|---|
| | Ho: Css=Ck | | Ho: E=Css+Ck | | | | |
| Post Prekindergarten | < 1 | Css=Ck | 36.19** | E > Css+Ck | | | |
| | Ho: $C_1$=Css+Ck | | Ho: E=Css+Ck | | Ho: E=$C_1$ | | |
| Postkindergarten | 17.52** | $C_1$<Css+Ck | 19.09** | E>Css+Ck | 66.77** | E >$C_1$ | |
| Post Third Grade | 1.72 | $C_1$=Css+Ck | 5.55** | E>Css+Ck | 8.72 | E>$C_1$ | < .02 |

** p < .01

## Table 10

### Means, n's, and Standard Deviations of the Lorge-Thorndike Group Intelligence Test Scores for Each Group At Each Testing Period

| | Group | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wave | E | | | Css | | | Ck | | | $C_1$ | | |
| | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
| | First Grade | | | | | | | | | | | |
| 1 | 39 | 97.21 | 8.80 | 26 | 92.08 | 10.69 | 20 | 95.15 | 11.16 | 28 | 87.29 | 8.10 |
| 2 | 30 | 91.77 | 9.79 | 22 | 90.14 | 8.65 | 31 | 86.87 | 13.74 | 54 | 85.94 | 9.65 |
| 3 | 42 | 93.38 | 7.94 | 20 | 85.70 | 15.96 | 41 | 91.29 | 10.32 | 42 | 86.57 | 11.81 |
| 4 | 42 | 91.10 | 9.81 | 9 | 87.56 | 8.38 | 34 | 88.91 | 11.11 | 22 | 86.05 | 6.83 |
| Total | 153 | 93.41 | 9.29 | 77 | 89.34 | 11.66 | 126 | 90.17 | 11.76 | 146 | 86.40 | 9.63 |
| | Second Grade | | | | | | | | | | | |
| 1 | 37 | 93.41 | 10.09 | 17 | 88.76 | 15.79 | 13 | 86.31 | 11.96 | 21 | 85.62 | 11.24 |
| 2 | 28 | 90.11 | 10.86 | 21 | 88.95 | 9.55 | 24 | 88.50 | 11.24 | 41 | 86.27 | 11.08 |
| 3 | 37 | 93.84 | 10.56 | 17 | 83.76 | 18.43 | 34 | 90.44 | 11.42 | 31 | 85.39 | 12.52 |
| 4 | 27 | 91.00 | 11.87 | 4 | 97.75 | 12.86 | 18 | 84.00 | 13.51 | 10 | 82.70 | 9.52 |
| Total | 129 | 92.31 | 10.77 | 59 | 88.00 | 14.65 | 89 | 88.01 | 11.91 | 103 | 85.53 | 11.32 |

second grades.[3] Separate 4x4 analyses of variance (Wave x Subject Group) were performed at each grade level for E, Css, Ck and $C_1$ subjects in waves 1-4. These analyses are summarized in Table 11. (See Tables P and Q in Appendix I for complete tables.)

First Grade: Table 10 shows that after three years of enrichment, the E group had a mean of 93.41, while Css, Ck and $C_1$ groups had means of 89.34, 90.17 and 86.40, respectively.

Analysis of variance was performed on L-T scores at the end of first grade for all subject groups for four waves (Table 11 and Appendix I, Table P). Both wave ($F=4.36$; $p<.01$) and Subject Group ($F=8.26$; $p<.0001$) were the main significant effects. The interaction of Wave x Subject Group did not reach the $p=.05$ level of significance.

From inspection of the Table of Means (Table 10), it appears that the Wave effect is attributable to the high score of the first wave. Orthogonal comparisons of the subject group means (Table 12) revealed that the E group scored significantly higher than the combined Css-Ck group ($p<.01$) as well as the $C_1$ group ($p<.01$). The Css-Ck group scored significantly higher than the $C_1$ group ($p<.01$).

Second Grade: Inspection of the second grade means shown in Table 10 shows that, while the mean for the E group was 92.31, the means for the Css, Ck and $C_1$ groups were 88.00, 88.01 and 85.53, respectively.

A two-way analysis of variance (Wave x Subject Group) was performed on L-T scores for all subject groups over waves 1-4 (Table 11 and Appendix I, Table Q). At second grade only the Subject Group main effect was significant ($F=4.51$; $p<.005$). However, the Wave x Subject Group interaction term was found to be close to significance, ($F=1.88$; $p<.06$).

Orthogonal comparisons were applied to the subject group means (Table 12). The E vs. Css-Ck comparison was significant ($p<.02$), as was the E vs. $C_1$ comparison ($p<.01$). The $C_1$ vs. Css-Ck difference was also significant ($p<.02$). The direction of differences was the same as for grade one, favoring the E group.

The Reading Prognosis Test (RPT): The Reading Prognosis Test was administered to all subject groups at the end of kindergarten. Table 13 shows the means and n's for all E, Css, and Ck subjects across four waves. The E group means was 28.22, while the Css and Ck group means were 23.74 and 22.84, respectively.

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[3] It should be noted that the small n in wave 4 was due to the inaccessibility of subjects, which resulted from the difficulties which beset some of the schools during the end of the 1968-69 school year.

Table 11

Summary of Analyses of Variance of
Lorge-Thorndike Intelligence Tests
For All Subject Groups At First and Second Grades

| Testing Period | Wave (A)<br>F | Subject Group (B)<br>F | AB<br>F |
|---|---|---|---|
| First Grade | 4.36* | 8.26 ** | <1 |
| Second Grade | <1 | 4.51** | 1.88 |

* p <.01     ** p <.0001

## Table 12

Orthogonal Comparison of Subject Groups
For Lorge-Thorndike Group Intelligence Test IQ Scores

| Test Period | $H_o$: $C_1=Css+Ck$ |  |  | Ho: $E=Css+Ck$ |  |  | Ho: $E=C_1$ |  |
|---|---|---|---|---|---|---|---|---|
|  | F | Conclusion |  | F | Conclusion |  | F | Conclusion |
| Post First Grade | 8.27** | $C_1<Css+Ck$ |  | 10.59** | $E>Css+Ck$ |  | 34.31** | $E>C_1$ |
| Post Second Grade | 5.40 | $C<Css+Ck$ | $<.02$ | 6.00 | $E>Css+Ck$ | $<.02$ | 10.90 | $E>C_1$ |

** $p<.01$

### Table 13

Means and n's of the Reading Prognosis Test Raw Scores for All E, Css, and Ck Subjects at Kindergarten

| Wave | Group | | | | | |
|---|---|---|---|---|---|---|
| | E | | Css | | Ck | |
| | N | $\bar{X}$ | N | $\bar{X}$ | N | $\bar{X}$ |
| 1 | 42 | 35.00 | 29 | 27.00 | 34 | 19.44 |
| 2 | 42 | 26.55 | 28 | 20.96 | 47 | 23.04 |
| 3 | 47 | 26.11 | 19 | 21.21 | 57 | 24.18 |
| 4 | 47 | 25.77 | 20 | 25.30 | 51 | 22.33 |
| Total | 178 | 28.22 | 96 | 23.74 | 189 | 22.84 |

A two-way analysis of variance--Wave x Subject Group--summarized in Table 14 (completely reported in Table R of Appendix I) was performed on RPT scores for all groups over four waves. Subject Group was shown to be a significant main effect ($p < .005$). A significant wave effect was also found ($p < .05$). A significant interaction was found ($p < .005$). The wave effect seems to be a result of the fact that higher scores were obtained by wave 1; this difference is consistent with the data obtained on initial IQ differences between the waves, as discussed above.

Table 14
(I)

Summary of Analysis of Variance of Reading Prognosis Test Raw Scores for All E, Css, and Ck Subjects by Wave and Subject Group

| Source | F |
|---|---|
| Subject Group (A) | 14.38** |
| Wave (B) | 2.86* |
| AB | 4.31** |

$*p < .05$
$**p < .01$

A simple effects analysis is summarized in Table 15 (completely reported in Appendix I, Table S). Subject Group effect occurred in wave 1, while the direction of the difference in favor of the E group was apparent for all waves.

Table 15

Summary of Analysis of Simple Effects for Reading Prognosis Test on E, Css, Ck Over Four Waves

| Source | F |
|---|---|
| B for $A_1$ (E) | 6.89** |
| $A_2$ (Css) | 3.16** |
| $A_3$ (Ck) | 1.43 |
| A for $B_1$ (Wave 1) | 21.70* |
| $B_2$ (Wave 2) | 2.79 |
| $B_3$ (Wave 3) | 2.13 |
| $B_4$ (Wave [illegible]) | 1.22 |

$*p < .05$
$**p < .01$

Orthogonal comparisons (Table 16) showed the E groups as scoring higher than the combined Css-Ck group. The Css and Ck groups did not differ from each other.

Table 16

Orthogonal Comparison of Subject Groups Over Four Waves for Reading Prognosis Test

|  | Ho: E=Ck+Css |  |
|---|---|---|
|  | F-Ratio | Conclusion |
| Waves 1, 2, 3 and 4 | 53.88 | $E > Ck+Css$ |

The Metropolitan Achievement Tests--Reading Subtest (MAT Reading): The Metropolitan Reading Test was administered by the Board of Education to second and third grade children in all the public schools of New York City. The test is administered either in March or April. (Grade level norms are therefore 3.7 and 2.7). The Metropolitan Reading Test has two parts: Word Knowledge and Reading. Analyses of variance were always two-way (Wave x Subject Group). These analyses are summarized in Table 18, and are completely reported in Tables T, U, V, and W.

Second Grade Word Knowledge: Table 17 shows the mean equivalent scores for the Word Knowledge subtest at second grade for all subject groups over three waves (waves 2, 3, and 4). Scores for children in wave 1 were not available, as the schools from which we obtained the scores did not give the test to those children.

The analysis of variance, summarized in Table 18 (completely reported in Appendix I, Table T) showed a significant Subject Group main effect ($F=2.92$; $p<.05$) and no significant wave effect. No significant interaction effect was found.

Orthogonal comparisons (Table 19) showed that the E group was significantly higher than the $C_1$ group ($p<.01$), but not significantly different from the combined Css-Ck group. The $C_1$ group was significantly lower than the combined Css-Ck group ($p<.01$).

In addition, comparison was made between the E group scores and the mean grade equivalent scores for those schools in which the IDS program operates (see Table 20). Also reported in Table 20 are the results of t test analyses which were performed to compare the E group mean to the mean of school norms (waves 2, 3, and 4 combined). The E group was found to be significantly higher than the average of the school norms ($p<.001$; one-tailed test).

Third Grade Word Knowledge: Table 17 shows the mean grade equivalent scores for Word Knowledge for all subject groups over the first three waves.

# Table 17

Means, N's, and Standard Deviations of the Metropolitan Achievement Tests Reading and Arithmetic Subtests for Second and Third Grade At Each Testing Period

| Wave | Group | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | | | Css | | | Ck | | | $C_1$ | | |
| | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
| Word Knowledge-Second Grade | | | | | | | | | | | | |
| 2 | 29 | 2.64 | .57 | 21 | 2.42 | .65 | 25 | 2.41 | .62 | 39 | 2.36 | .63 |
| 3 | 33 | 2.76 | .92 | 13 | 2.46 | .83 | 33 | 2.77 | .74 | 27 | 2.37 | .87 |
| 4 | 30 | 2.55 | .80 | 12 | 2.78 | .60 | 24 | 2.56 | .91 | 16 | 2.16 | .39 |
| Total | 92 | 2.65 | .77 | 46 | 2.53 | .69 | 82 | 2.60 | .76 | 82 | 2.32 | .68 |
| Word Knowledge-Third Grade | | | | | | | | | | | | |
| 1 | 34 | 3.36 | .80 | 13 | 3.36 | .92 | 11 | 2.79 | .37 | 17 | 2.97 | .90 |
| 2 | 21 | 3.40 | .60 | 12 | 3.13 | .52 | 19 | 2.95 | .99 | 28 | 3.14 | .96 |
| 3 | 29 | 3.80 | 1.06 | 11 | 3.42 | .97 | 31 | 3.79 | 1.51 | 17 | 3.19 | 1.08 |
| Total | 84 | 3.52 | .85 | 36 | 3.30 | .81 | 61 | 3.35 | 1.29 | 62 | 3.11 | .96 |

Table 17 (con't)

| Wave | Group<br>E<br>N | <br><br>$\bar{X}$ | <br><br>S.D. | <br>Css<br>N | <br><br>$\bar{X}$ | <br><br>S.D. | <br>Ck<br>N | <br><br>$\bar{X}$ | <br><br>S.D. | <br>$C_1$<br>N | <br><br>$\bar{X}$ | <br><br>S.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Reading-Second Grade | | | | | | | |
| 2 | 29 | 2.50 | .75 | 21 | 2.31 | .61 | 25 | 2.42 | .69 | 39 | 2.29 | .63 |
| 3 | 33 | 2.61 | .84 | 13 | 2.52 | 1.33 | 33 | 2.72 | .92 | 27 | 2.29 | .87 |
| 4 | 30 | 2.60 | .79 | 12 | 2.84 | .84 | 24 | 2.74 | 1.00 | 16 | 2.31 | .52 |
| Total | 92 | 2.57 | .79 | 46 | 2.51 | .92 | 82 | 2.63 | .88 | 82 | 2.29 | .69 |
| | | | | | Reading-Third Grade | | | | | | | |
| 1 | 34 | 3.25 | .62 | 13 | 3.28 | .87 | 11 | .56 | .56 | 17 | 3.20 | .40 |
| 2 | 21 | 3.20 | .68 | 12 | 2.96 | .64 | 19 | .71 | .71 | 28 | 2.87 | .79 |
| 3 | 29 | 3.75 | 1.47 | 11 | 3.02 | 1.03 | 31 | 1.31 | 1.31 | 17 | 3.02 | .72 |
| Total | 84 | 3.41 | 1.02 | 36 | 3.09 | .84 | 61 | 3.18 | 1.06 | 62 | 3.00 | .68 |

## Table 17 (con't)

| Wave | Group |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | E |  |  | Css |  |  | Ck |  |  | $C_1$ |  |  |
|  | Computation-Third Grade |  |  |  |  |  |  |  |  |  |  |  |
| - | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
| 1 | 32 | 3.02 | .69 | 13 | 3.23 | .88 | 12 | 3.13 | .63 | 17 | 3.18 | 1.49 |
| 2 | 21 | 3.04 | .73 | 13 | 2.91 | .66 | 20 | 3.21 | .85 | 28 | 2.78 | 2.82 |
| 3 | 20 | 3.44 | .62 | 10 | 3.52 | 1.01 | 21 | 3.47 | 1.00 | 13 | 2.82 | 2.88 |
| Total | 74 | 3.14 | .69 | 36 | 3.20 | .86 | 53 | 3.29 | .86 | 58 | 2.91 | .76 |

Table 17 (con't)

Problem Solving and Concept Subtest

| Wave | Group<br>E | | | Css<br>Third Grade | | | Ck | | | $C_1$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D | N | $\bar{X}$ | S.D. | N | $\bar{X}$ | S.D. |
| 1 | 33 | 3.38 | .57 | 13 | 3.23 | .85 | 12 | 3.24 | .80 | 17 | 3.16 | .46 |
| 2 | 21 | 3.41 | .87 | 13 | 3.12 | .54 | 20 | 3.14 | .73 | 28 | 3.00 | .64 |
| 3 | 20 | 3.69 | .94 | 10 | 3.85 | 1.52 | 21 | 3.71 | 1.22 | 13 | 3.22 | 1.16 |
| Total | 74 | 3.47 | .77 | 36 | 3.20 | 1.01 | 53 | 3.39 | .98 | 58 | 3.10 | .73 |

Table 18

Summary of Analysis of Variance of
Metropolitan Achievement Test Scores for
All Groups at Second and Third Grades

|  | Reading Subtest |  | Arithmetic Subtest |  |
|---|---|---|---|---|
|  | Reading | Word Knowledge | Problem Solving | Computations |
| Source |  |  |  |  |
|  | Second Grade |  |  |  |
|  | F | F | F | F |
| Wave A | 1.98 | <1 |  |  |
| Subject Group B | 2.12 | 2.92 |  |  |
| AB | <1 | 1.09 |  |  |
|  | Third Grade |  |  |  |
| Wave A | 2.64 | 4.09 | 5.04 | 2.95 |
| Subject Group B | 1.65 | 1.79 | 1.63 | 1.84 |
| AB | <1 | <1 | <1 | 1.10 |

## Table 19

## Orthogonal Comparison of Subject Groups For Metropolitan Achievement Test Knowledge

| Test Period | Ho: $C_1$=Css+Ck<br>F | Conclusion | Ho: E=Css+Ck<br>F | Conclusion | Ho: $E=C_1$<br>F | Conclusion |
|---|---|---|---|---|---|---|
| Word Knowledge | | | | | | |
| Post Second Grade | 6.47* | $C_1$<Css+Ck | 1.17 | E=Css+Ck | 9.98* | E>$C_1$ |
| Post Third Grade | <1 | $C_1$=Css+Ck | 3.53 | E=Css+Ck | 6.42** | E>$C_1$ |
| Reading | | | | | | |
| Post Second Grade | 6.26** | $C_1$<Css+Ck | <1 | E=Css+Ck | 4.71** | E>$C_1$ |
| Post Third Grade | <1 | $C_1$=Css+Ck | 3.94** | E>Css+Ck | 5.85** | E>$C_1$ |

* $p<.05$ ** $p<.01$

Table 19 (con't)

Orthogonal Comparison of Subject Groups
For Metropolitan Arithmetic Test

Problem Solving

| Test Period | Ho: $C_1$=Css+Ck | | Ho: E=Css+Ck | | Ho: E=$C_1$ | |
|---|---|---|---|---|---|---|
| | F | Conclusion | F | Conclusion | F | Conclusion |
| Post Third Grade | 3.09 | $C_1$=Css+Ck | <1 | E=Css+Ck | 6.10** | E>$C_1$ |
| | | Computation | | | | |
| Post Third Grade | 5.66* | $C_1$< Css+Ck | <1 | E=Css+Ck | 3.18 | E=$C_1$ |

* $p < .05$ ** $p < .01$

## Table 20

### Mean Grade Equivalent Scores and t Ratios Obtained for Metropolitan Achievement Tests Reading and Arithmetic Subtests

|  | Group |  |
|---|---|---|
| Wave | Schools with Institute Classes | E |
|  | 2nd grade word knowledge* |  |
| 2 | 2.4 | 2.7 |
| 3 | 2.4 | 2.8 |
| 4 | 2.5 | 2.6 |
|  | 3rd grade word knowledge** |  |
| 1 | 3.1 | 3.4 |
| 2 | 2.9 | 3.4 |
| 3 | 3.1 | 3.8 |
|  | 2nd grade reading*** |  |
| 2 | 2.4 | 2 6 |
| 3 | 2.4 | 2.6 |
| 4 | 2.5 | 2.6 |
|  | 3rd grade reading**** |  |
| 1 | 3.2 | 3.3 |
| 2 | 3.1 | 3.4 |
| 3 | 2.9 | 3.0 |
|  | 3rd grade problem solving and concepts***** |  |
| 1 | 3.2 | 3.4 |
| 2 | 3.1 | 3.4 |
| 3 | 3.2 | 3.7 |
|  | 3rd grade computation |  |
| 1 | 3.1 | 3.0 |
| 2 | 2.9 | 3.0 |
| 3 | 3.1 | 3.4 |

* $t=3.75$ $p < .001$ (one tailed)

** $t=5.56$ $p < .001$

*** $t=2.50$ $p < .01$

**** $t=2.73$ $p < .005$

***** $t=3.30$ $p < .001$

The analysis of variance, summarized in Table 18 (completely reported in Appendix I, Table U) showed a significant wave effect ($F=4.09$; $p < .02$) and no significant Subject Group effect.

Examination of the table of means (Table 17) showed that the mean for the second wave was higher than that for the first wave; furthermore, the mean for the third wave was greater than that for the second wave. No significant interaction was found.

Orthogonal comparisons (Table 19) showed the E group to be significantly higher than the $C_1$ group ($p < .05$). Although the E group scored higher than combined Css-Ck group (see Table 17) the difference did not reach significance. No significant difference was found between the $C_1$ group and the combined Css-Ck group.

Table 20 shows the third grade mean equivalent scores of the schools where IDS had its demonstration program. In all cases, the mean of the E group was higher than the overall school mean, and was almost at grade level. Table 20 shows the _t_ tests that were done to compare the E group grade equivalent scores for the combined first three waves with the overall school mean for that time period. The E group mean was significantly higher than the school mean ($p < .001$; one-tailed).[4]

Second Grade Reading: Table 17 shows the mean grade equivalent scores for second grade reading for all subject groups over three waves (waves 2, 3, and 4).

The analysis of variance (see Table 18 and Table V of Appendix I) showed no significant wave or subject group main effect differences and no significant interaction effect. Examination of the table of means (Table 17) showed that the Ck groups scored slightly higher than the E or Css groups. Orthogonal comparisons (Table 19) showed no differences between the E and combined Css-Ck group. The E group scored significantly higher than the $C_1$ group ($p < .05$), the Css-Ck group also scored significantly higher than the $C_1$ group ($p < .05$).

Table 17 shows the mean grade equivalent scores for the schools where IDS had its demonstration classes. The E group mean was higher than the means of all the school norms at every wave; the E group mean was close to or at grade level. Table 19 shows _t_ tests that were done to compare the E group mean to the average of school norms for waves 2, 3, and 4 combined. The E group scored significantly higher than the school norm ($p < .01$; one-tailed test).

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[4] The _t_ test used in this analysis, as well as in the other Metropolitan Achievement Test analyses involved comparing the obtained mean of the E sample with an expected mean, the overall school mean. See Peatman, 1963.

Third Grade Reading: Table 17 shows the mean grade equivalent scores for third grade reading for E, Css, Ck and $C_1$ groups over the first three waves.

The analysis of variance (see Table 18 and Table W of Appendix I) showed no significant subject group or wave differences and no significant interaction effect. The table of means (Table 17) shows that, as in the Word Knowledge subtests, the E group scored higher than all other groups. Orthogonal comparisons (Table 19) showed the E group to be significantly higher than the combined Css-Ck group ($p < .05$) and also higher than the $C_1$ group ($p < .02$).

The E group mean grade equivalent score was higher than the average of the school norms (see Table 20). Again t tests were done to compare the E group to the school norm for the combined first three waves (Table 20). The E group had a significantly higher score than the school norm ($p < .005$; one-tailed test).

Metropolitan Arithmetic Test: The Metropolitan Arithmetic Test was administered by the Board of Education to third grade children in all the public schools of New York City. The test was given in March or April. (Grade level was 2.7 and 3.7.) The test has two parts: Problem Solving and Computation.

Third Grade Problem Solving and Concepts: Table 17 shows the mean grade equivalent scores for the Problem Solving subtest for E, Css, Ck, and $C_1$ groups over the first three waves.

In the analysis of variance (Table 18 and Table X of Appendix I), wave was found to be the only significant main effect ($F=5.01$; $p < .01$). The wave effect was a result of the high scores at wave 3 for all groups. Inspection of the means (Table 17) showed that the main effect of wave was a result of high scores at wave 3 for all groups. In fact, the mean of the E group for wave 3 was higher than that for wave 2; moreover, the mean for wave 2 was higher than that for wave 1. The E group mean was somewhat higher than the means for all other groups; the differences did not reach significance.

Orthogonal comparisons (Table 19) showed the E group to be significantly higher than the $C_1$ group ($p < .05$). No significant differences were found between either the E group and Css-Ck group or between the Css-Ck group and the $C_1$ group.

Table 20 shows the mean grade equivalent scores for the E group and the mean grade equivalent scores for the schools in which the IDS program operated. Again, t tests (Table 20) were done to compare the E group mean with the mean of school norms for the combined waves 1 to 3. The E group mean was significantly higher than the average of the school norms ($p < .001$; one-tailed test).

Third Grade Computation: Table 17 shows the mean grade equivalent scores for Computation for E, Css, Ck and $C_1$ groups over the first three waves.

The analysis of variance (see Table 18 and Table Y of Appendix I) showed no significant interaction effect. Examination of the means (Table 17) shows the Css and Ck groups to be slightly higher than the E groups.

Orthogonal comparisons (Table 19) showed no significant difference between the E group and combined Css-Ck group. There was no significant difference between the E group and $C_1$ group. The $C_1$ group was significantly lower than the combined Css-Ck group.

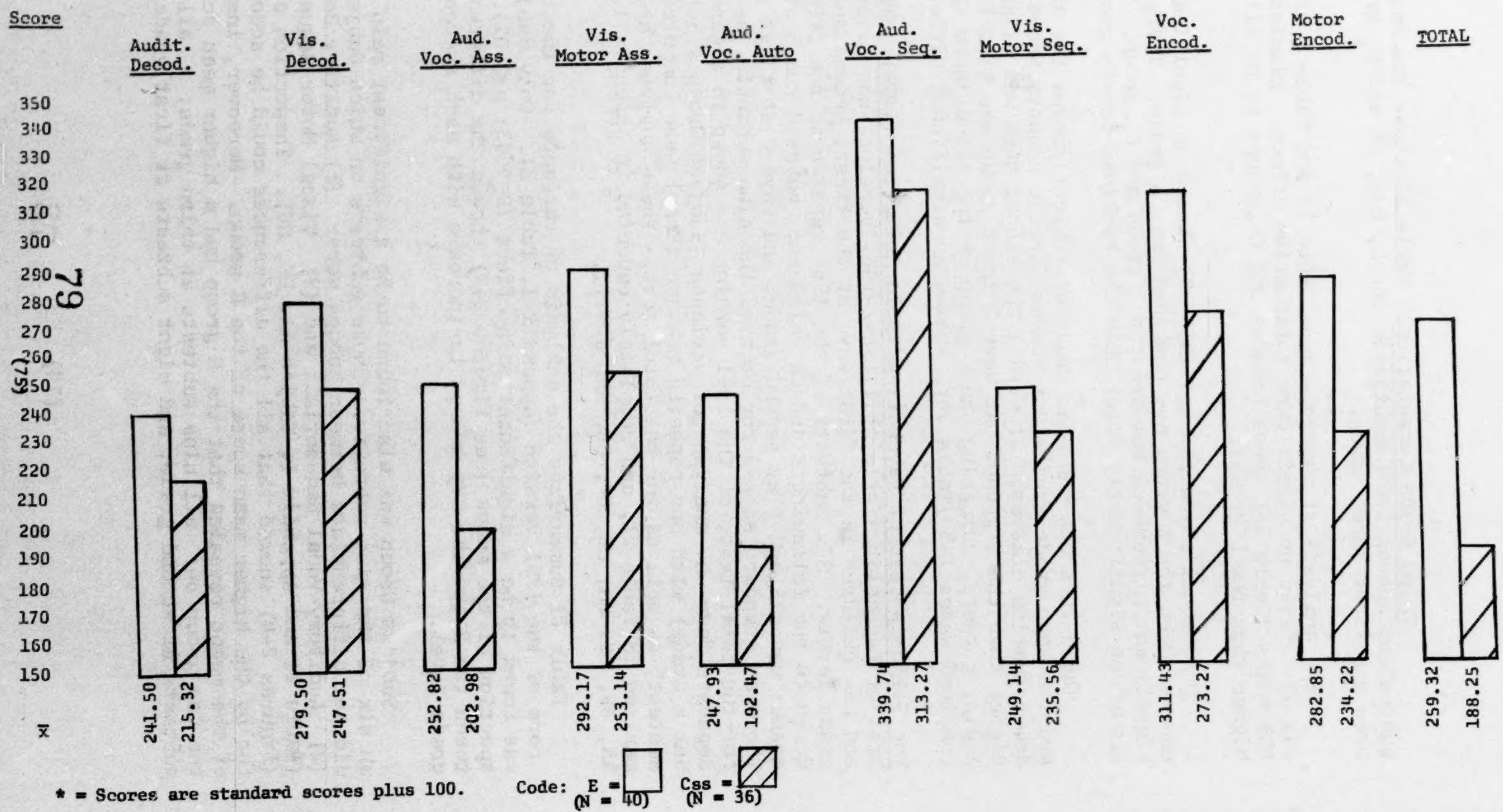
Table 20 shows the mean grade equivalent scores for the E group and the mean grade equivalent scores for the schools where IDS had demonstration classes. At wave 1 the school norm was slightly higher than the E group. At wave 2 the E group was slightly higher. Again, $t$ tests, comparing the E group to the school norm for the combined waves 1-3 (Table 20), showed no significant differences.

The Illinois Test of Psycholinguistic Abilities (ITPA): The Illinois Test of Psycholinguistic Abilities--1961 version--was given to E and Css children in the first wave at the first, second and third grade levels. Six subtests of the 1968 version of the ITPA were given to the following E and Ck children: waves 4 and 5 at third grade; waves 5 and 6 at second grade; and wave 6 at first grade. The mean standard scores for each of the nine subtests, as well as for the total test, of the 1961 version are shown in figures 1-4. Separate four-way analyses of variance (Subject Group x School x Sex x Grade) with one repeated measure (Year) were computed for each subtest, as well as for the total test. These analyses are summarized in Table 21, and completely reported in Appendix I, Tables Z, AA, BB, CC, DD, EE, FF, GG, HH, and II.

Table 21 summarizes the analysis of variance for the total score of the 1961 version (Appendix I, Table Z). Only Subject Group was found to be a significant main effect ($F=9.43$; $p<.01$). Inspection of the means (see figures 2-4) showed the difference between the E and the Css groups to increase with each successive grade level.

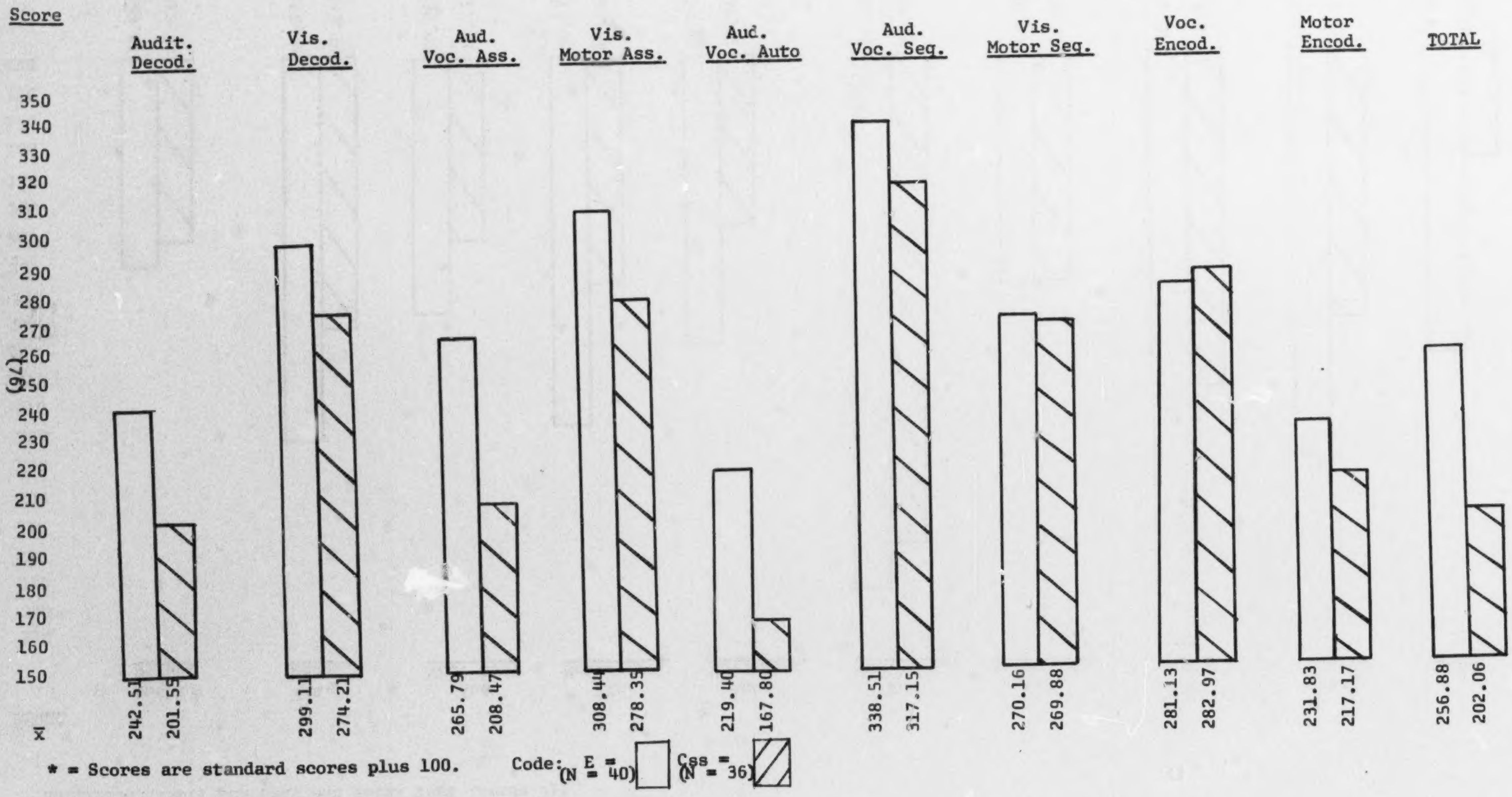
Subject Group was also found to be a significant main effect on six of the nine subtests. Those subtests on which Subject Group did not differentiate between groups were: (1) Auditory Decoding; (2) Auditory-Vocal Sequential; and (3) Visual Motor Sequential (Table 21 and Appendix I, Tables AA, FF, GG). Inspection of the means (figures 2-4) showed that all the differences could be accounted for by the higher mean score of the E group. Moreover, inspection of the means revealed that the E group had a higher mean score than the Css group on: all nine subtests at third grade; all nine subtests at second grade; and eight subtests at first grade, all

**Figure 1:** Ns and Means for Illinois Test of Psycholinguistic Abilities (1961) Subtests and Total Test (Grades 1 - 3 combined)*



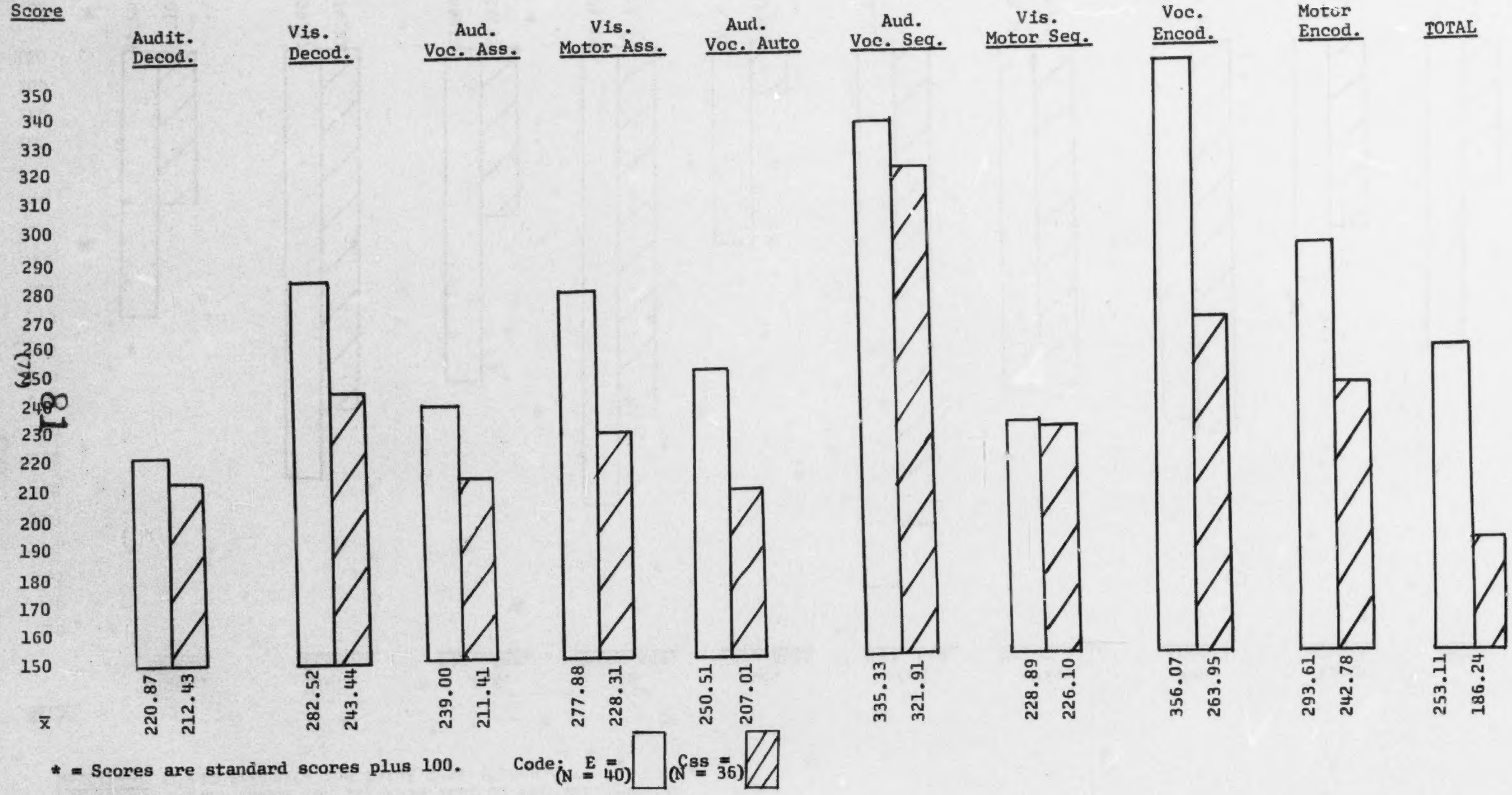
* = Scores are standard scores plus 100.

Figure 2: Ns and Means for Illinois Test of Psycholinguistic Abilities (1961) Subtests and Total Test (Grade 1)*



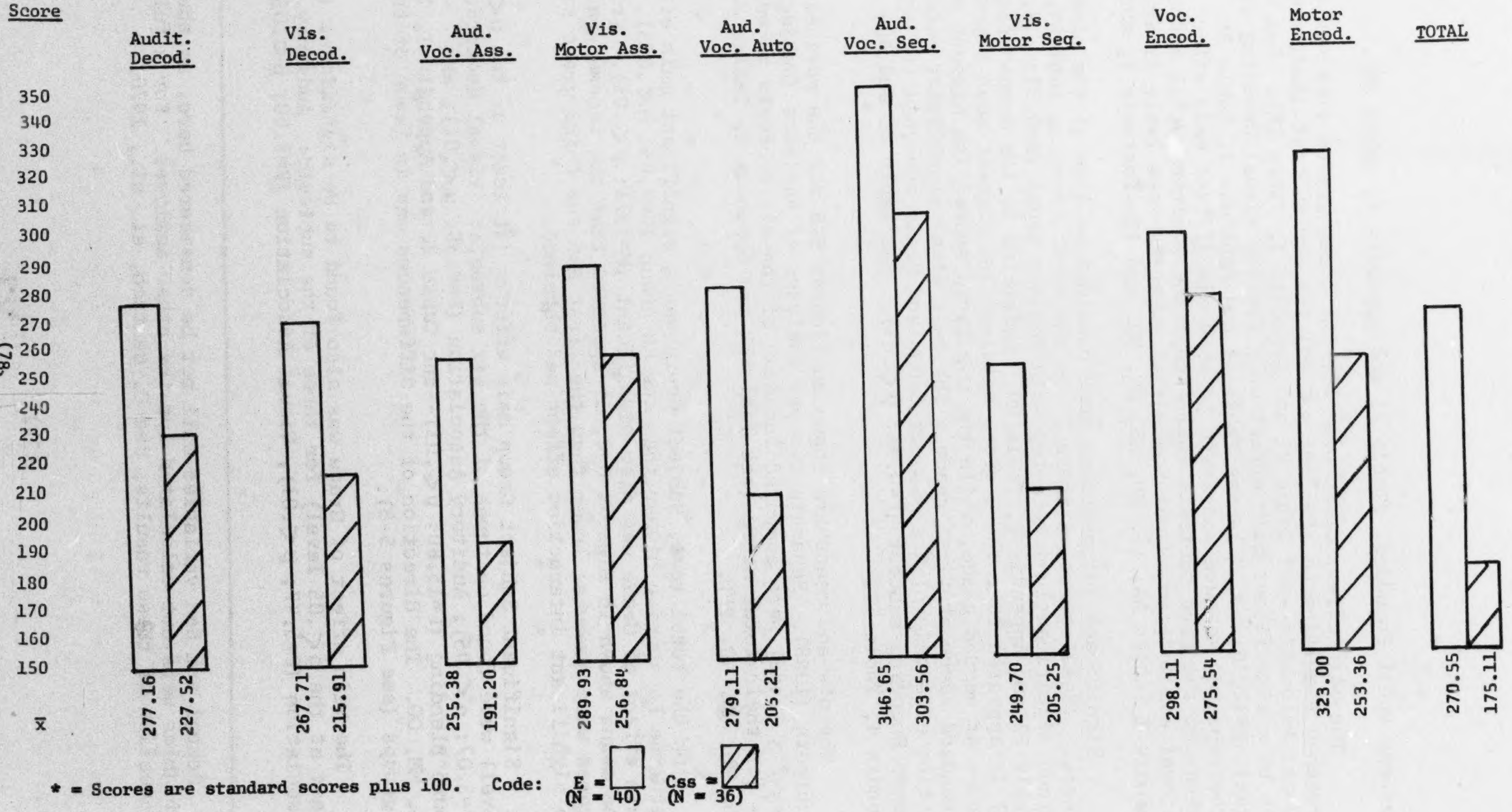
* = Scores are standard scores plus 100.

**Figure 3:** Ns and Means for Illinois Test of Psycholinguistic Abilities (1961) Subtests and Total Test (Grade 2)*



* = Scores are standard scores plus 100.

Figure 4: Ns and Means for Illinois Test of Psycholinguistic Abilities (1961) Subtests and Total Test (Grade 3)*



* = Scores are standard scores plus 100.

except Vocal Encoding, (Table 21 and Appendix I, Table HH).

The main effect of School[5] for the three grades combined only reached significance (F=5.98; $p<.05$) for one subtest (Auditory-Vocal Automatic--see Table 21 and Appendix I, Table EE). Sex was found to be a significant main effect only for the Visual Decoding subtest (F=12.70; $p<.01$)--see Table 21 and Appendix I, Table BB. Grade the repeated measure was found to be a significant main effect for seven of the nine subtests (all except the Auditory-Vocal Associational and Auditory-Vocal Sequential subtests--see Table 21 and Appendix I, Tables AA, BB, DD, EE, GG, HH, and II--footnote 5, above).

Significant interactions were obtained on five of the nine subtests. (See footnote 5 above.) On the Vocal Encoding subtest, Grade significantly interacted with Subject Group (F=9.31; $p<.01$). Table 21 and Appendix I, Table HH. Referring to the means (figures 2, 3) it appeared that the E group obtained its highest mean standard score at second grade, while the Css group scored its highest mean standard score at first grade. The only other significant interaction effect involving Subject Group and Grade occurred for the Motor Encoding subtest (F=4.91; $p<.01$). See Table 21 and Appendix I, Table II.

The n's and means are shown in figures 5-8 for the revised ITPA subtests (1968). Separate two-way analyses of variance (Subject Group x Grade) were computed for each of the six subtests as well as for their total score (see Table 22 and Appendix I, Tables JJ, KK, LL, MM, NN, OO, PP).

On the total test, Subject Group was a significant main effect, with the Es scoring higher than the Ck group (F=8.65; $p<.005$). The main effect of Grade was also significant (F=3.71; $p<.05$). From the means shown in figures 6-8, it appeared that the second grade scores were somewhat lower than the first and the third grade scores. No significant interaction effect was obtained.

Significant Subject Group main effects (at least at the $p<.05$ level) were found on three of the six subtests: Visual Reception (F=5.07; $p<.05$); Auditory Association (F=8.38; $p<.01$); and Sound Blending (F=15.80; $p<.01$)--see Table 22 and Appendix I, Tables LL, MM, OO. The direction of the differences was in favor of the E groups (see Figures 5-8).

The main effect of Grade was also found to be significant (at least at the $p<.05$ level) for three of the subtests: Auditory Association (F=5.47; $p<.01$), Visual Association (F=3.60; $p<.05$),

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[5] School and Sex variables will not be considered here, as these variables were not calculated for the other analyses. For a fuller discussion of these results, see C. Deutsch, et. al., 1970.

Table 21

Summary of the Analysis of Variance Tables of the Illinois Test of Psycholinguistic Abilities (1961 edition) Scores for Males and Females from Two Schools, under Two Treatments, over Three Years of Testing

| | Source | | | | | |
|---|---|---|---|---|---|---|
| | Subject Group (A) | School (B) | Sex (C) | Grade (D) | Significant Interaction | |
| | F | F | F | F | Type | F |
| Total Test | 9.43** | <1 | <1 | <1 | none | |
| Auditory Decoding Subtest | 1.86 | <1 | 1.47 | 4.77* | none | |
| Visual Decoding Subtest | 7.31** | <1 | 12.70** | 6.84** | AB<br>BD | 5.82*<br>5.92** |
| Auditory-Vocal Association Subtest | 5.72* | <1 | <1 | <1 | CD | 4.25* |
| Visual-Motor Association Subtest | 6.44* | 1.23 | <1 | 4.89** | none | |
| Auditory-Vocal Automatic Subtest | 5.27* | 5.98* | <1 | 7.14** | none | |
| Auditory-Vocal Sequential Subtest | 1 | <1 | <1 | <1 | none | |
| Visual-Motor Sequential Subtest | 1.20 | <1 | <1 | 10.11 | AC | 6.13* |
| Vocal Encoding Subtest | 5.44* | <1 | 2.77 | 3.40* | AD<br>CD<br>BCD | 9.31**<br>3.29*<br>3.14* |
| Motor Encoding Subtest | 11.91** | 3.13 | 2.36 | 12.72** | AD | 4.91** |

* $p < .05$  ** $p < .01$

Figure 5: Ns and Mean Scaled Scores for Six Subtests of the Illinois Test of Psycholinguistic Abilities (1968) for Grades 1-3 combined. (n = 60)

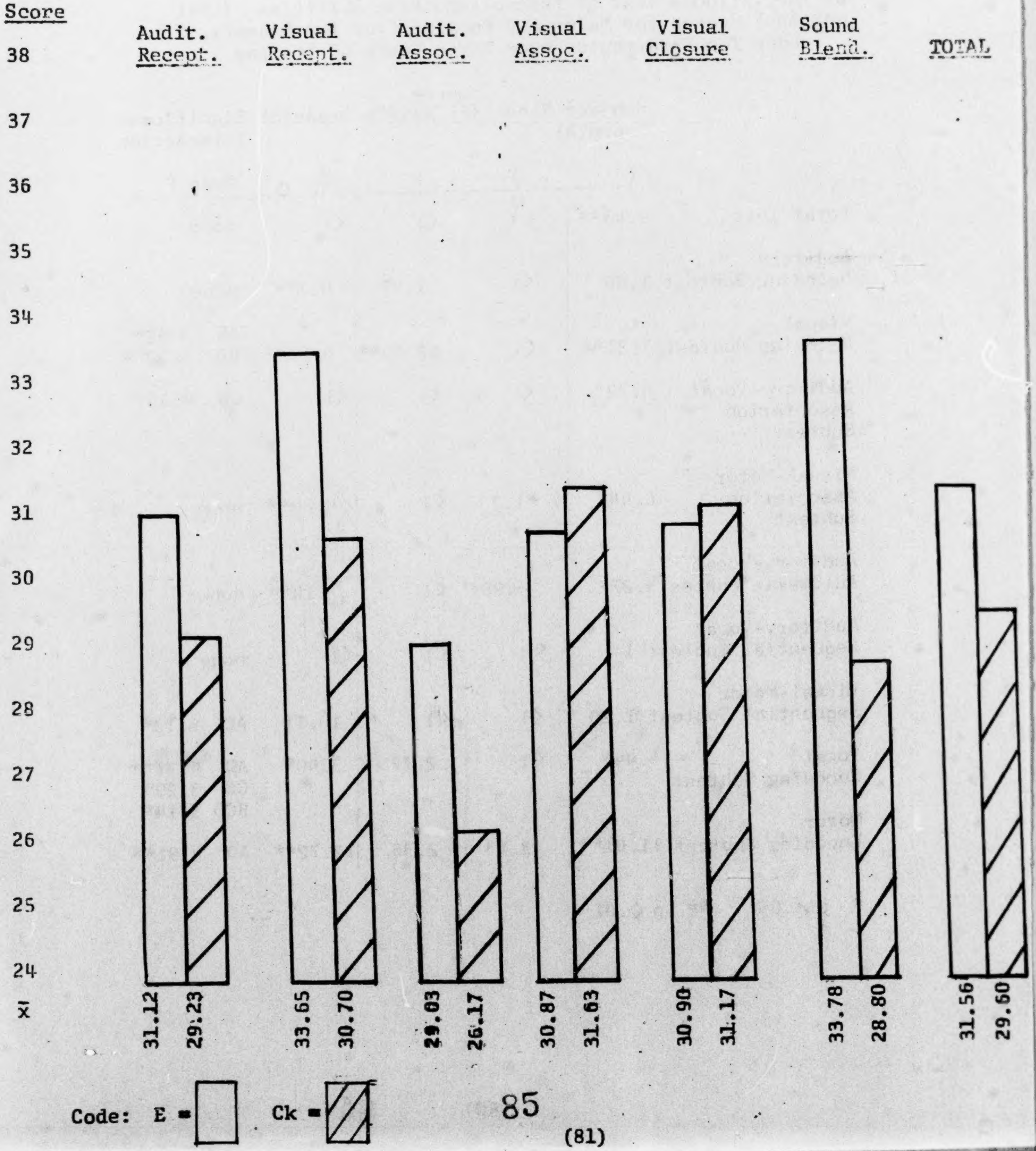


**Figure 6:** Ns and Mean Scaled Scores for Six Subtests of the Illinois Test of Psycholinguistic Abilities (1968) for Grade 1. (n = 20)

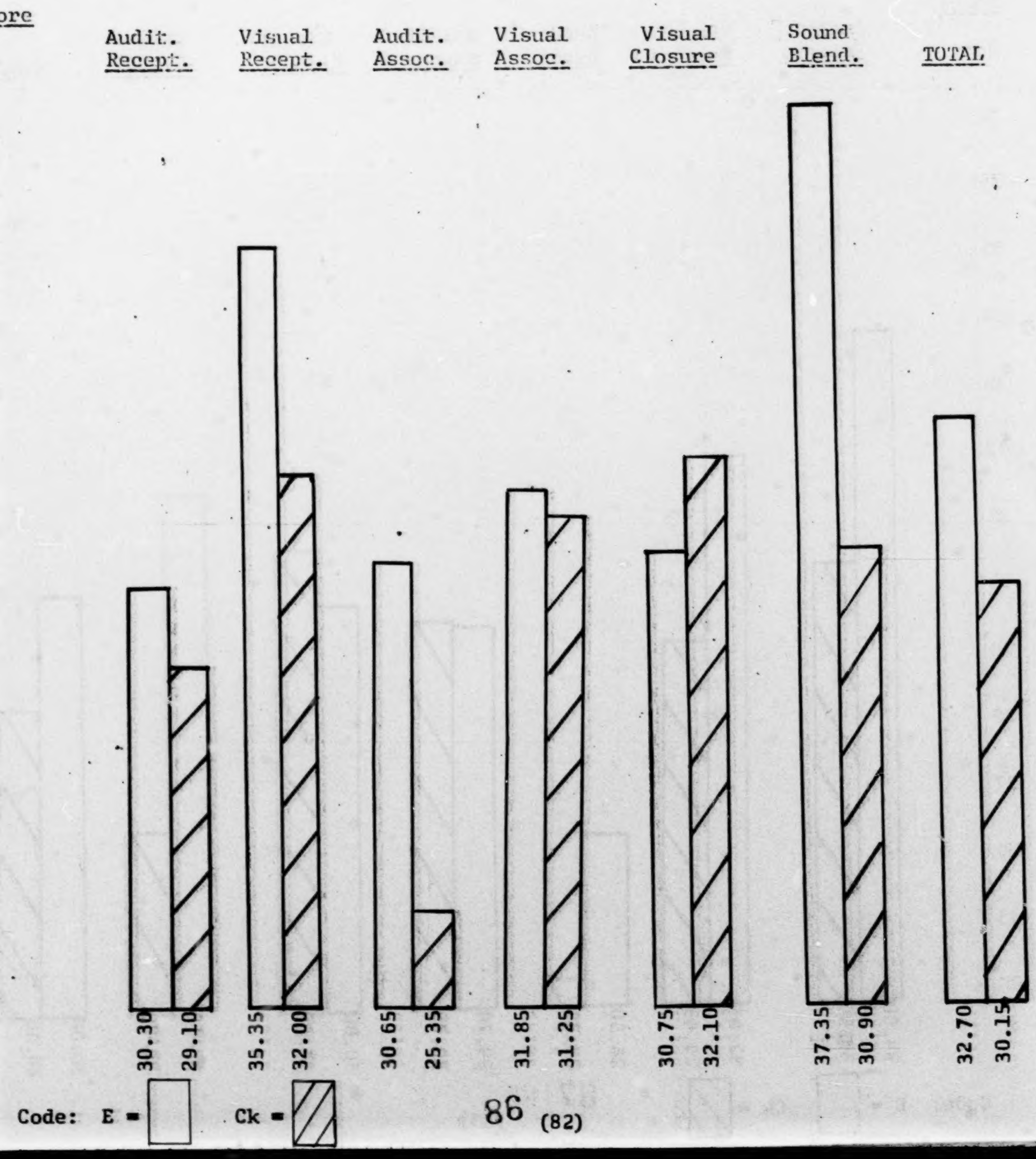


**Figure 7:** Ns and Mean Scaled Scores for Six Subtests of the Illinois Test of Psycholinguistic Abilities (1968) for Grade 2. (n = 20)

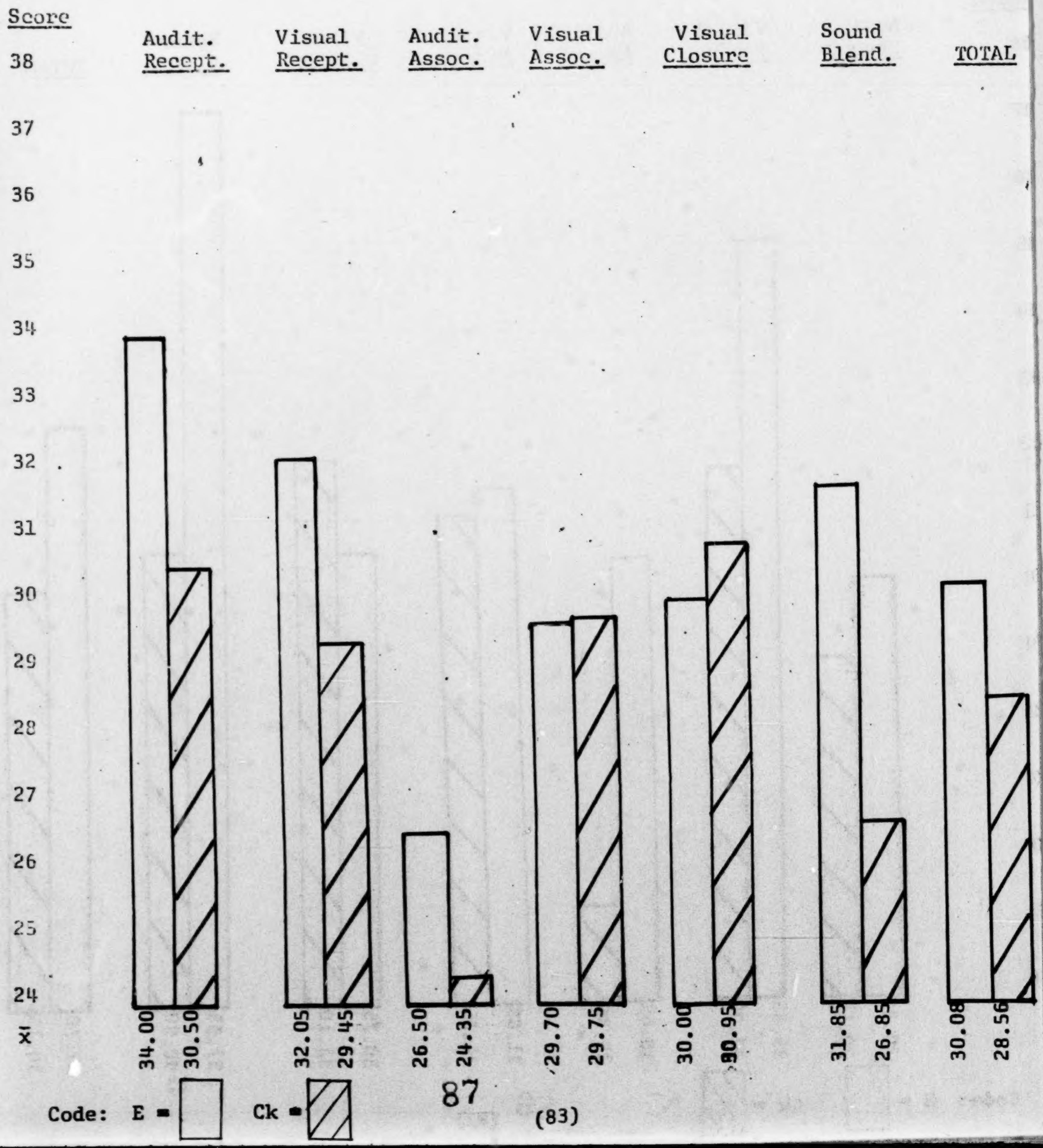
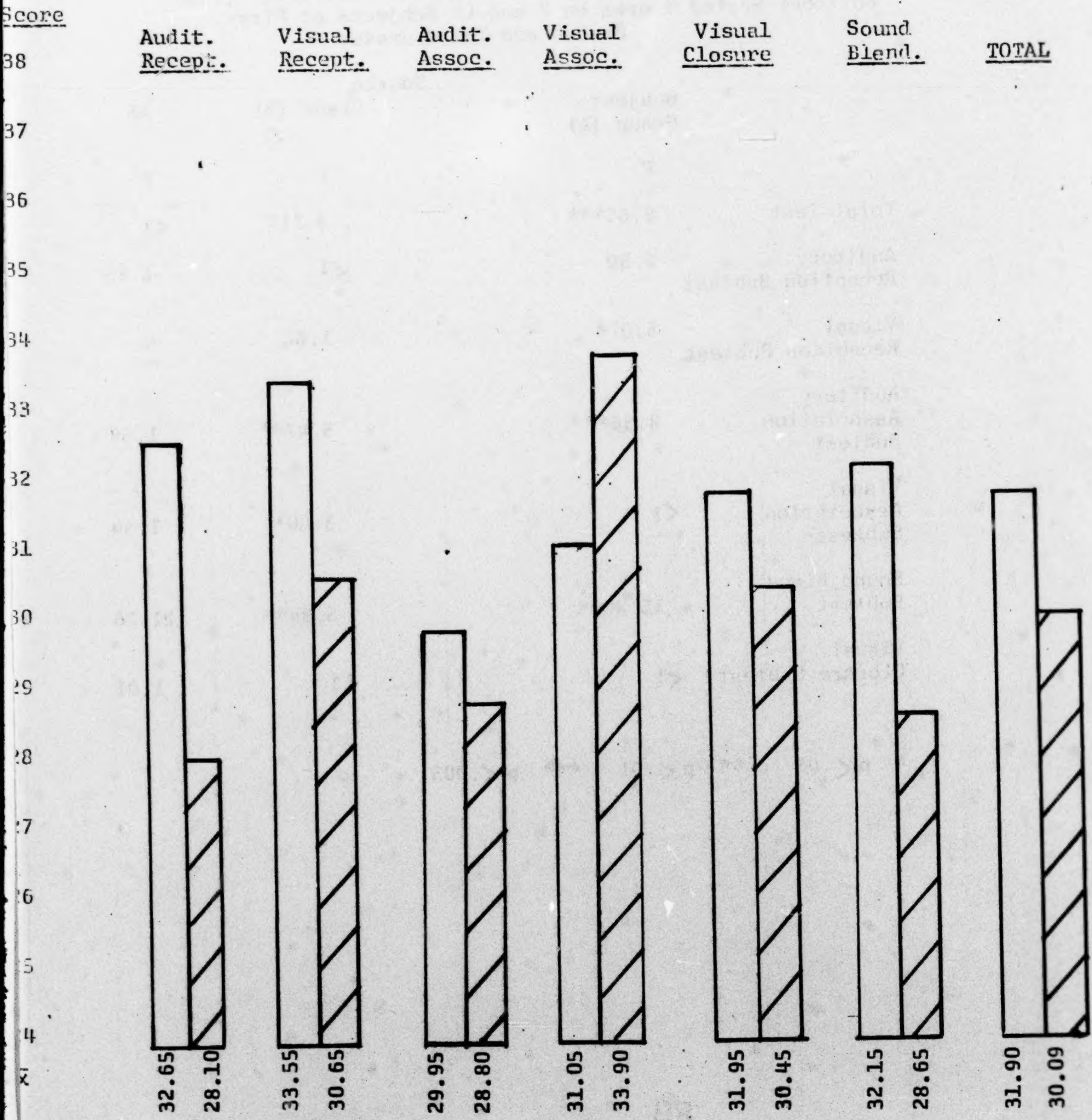


**Figure 8:** Ns and Mean Scaled Scores for Six Subtests of the Illinois Test of Psycholinguistic Abilities (1968) for Grade 3. (n = 20)



Code: E= ☐ Ck = ▨

## Table 22

### Summary of the Analysis of Variance Tables of the Illinois Test of Psycholinguistic Abilities (1968 edition) Scaled Scores on E and Ck Subjects at First, Second and Third Grades

| | Source | | |
|---|---|---|---|
| | Subject Group (A) | Grade (B) | AB |
| | F | F | F |
| Total Test | 8.65*** | 3.71* | <1 |
| Auditory Reception Subtest | 2.50 | <1 | 1.35 |
| Visual Reception Subtest | 5.07* | 1.66 | 4 |
| Auditory Association Subtest | 8.38** | 5.47** | 1.59 |
| Visual Association Subtest | <1 | 3.60* | 1.54 |
| Sound Blend Subtest | 15.80** | 5.34** | 21.76 |
| Visual Closure Subtest | <1 | <1 | 1.01 |

* $p < .05$ ** $p < .01$ *** $p < .005$

and Sound Blending (F=5.34; $p<.01$)--see Table 22 and Appendix I, Tables MM, NN, OO. In all three cases second grade standard scores were lowest. No significant interaction effect was found for any subtest.

Early Childhood Inventories: A group of inventories, which tap specific abilities and particular curriculum elements, was given to two waves of E children, and to their Ck controls, at the end of kindergarten. N's, means, and standard deviations for the E and Ck groups, over the fifth and sixth waves are shown in Table 23. The inventories were subjected to separate two-way analyses of variance (Wave x Subject Group). These analyses are summarized in Table 24, and completely reported in Appendix I, Tables QQ, RR, SS, TT, UU, VV, WW, and XX.

Alphabet Name Inventory (ANI/PUC): Table 23 shows the n's, means, and standard deviations for the E and Ck groups over two waves. Analyses of variance yielded no significant main effect or interaction (see Table 23, and Appendix I, Table QQ. Inspection of the means (Table 23), showed that, for both waves, a non-significant trend appeared, showing the E group to score somewhat higher.

Body Parts Name Inventory (BPNI): Table 23 shows the n's, means, and standard deviations for the E and Ck groups over two waves. Analysis of variance showed the groups to differ significantly (see Table 24 and Appendix I, Table RR), at the $p<.05$ level (F=6.87) the Table of Means (Table 23), showed that the source of the difference is due to the higher scores of the E group. The main effect of wave, as well as the Wave x Subject Group interaction, were not significant.

Numeral Name Inventory - 1 (NNI-1): Table 23 shows the n's, means, and standard deviations for the E and Ck groups over two waves. Analysis of variance indicated that no significant differences existed, on either the wave or Subject Group main effects (Table 24 and Appendix I, Table SS). Inspection of the means (see Table 23) showed that the direction of the difference was in favor of the E group, although for wave six the means were virtually identical. No significant interaction occurred here either.

Quantity Matching Inventory (QMI): Table 23 contains the n's, means, and standard deviations for the E and Ck groups over two waves. As in the ANI/PUC and NNI-1 no significant main effect of interaction was obtained (see Table 24 and Appendix I, Table TT). Again, a trend appeared, with the direction of the trend in favor of the E group.

Relational Concepts Inventory/Pre-Mathematics (RCI/PM): Table 23 lists the n's, means, and standard deviations for the E and Ck groups over two waves. Analysis of variance indicated a significant Subject Group main effect (F=8.68, $p<.01$). No significant wave effect or interaction was obtained (Table 24 and Appendix I, Table UU). Inspection of the means on Table 38 indicated that the E group scored higher.

## Table 23

## Means, N's, and Standard Deviations of Early Childhood Inventories Postkindergarten Scores for E and Ck Subjects in Waves 5 and 6

| Wave | E N | E $\bar{X}$ | E S.D. | Ck N | Ck $\bar{X}$ | Ck S.D. |
|---|---|---|---|---|---|---|
| **Alphabet Name Inventory** | | | | | | |
| 5 | 28 | 41.86 | 9.80 | 10 | 34.80 | 16.41 |
| 6 | 42 | 39.69 | 15.30 | 19 | 37.58 | 16.89 |
| Total | 70 | 40.56 | 13.33 | 29 | 36.62 | 16.49 |
| **Body Parts Inventory** | | | | | | |
| 5 | 28 | 20.39 | 2.33 | 10 | 17.40 | 4.00 |
| 6 | 42 | 18.95 | 3.01 | 19 | 18.26 | 4.73 |
| Total | 70 | 19.53 | 2.83 | 29 | 17.96 | 3.64 |
| **Numeral Name Inventory** | | | | | | |
| 5 | 28 | 30.78 | 7.99 | 10 | 23.20 | 14.83 |
| 6 | 42 | 26.50 | 12.43 | 19 | 26.21 | 13.25 |
| Total | 70 | 28.21 | 11.01 | 29 | 25.17 | 13.63 |
| **Quantity Matching Inventory** | | | | | | |
| 5 | 28 | 13.57 | 2.92 | 10 | 12.50 | 3.84 |
| 6 | 41 | 13.17 | 2.67 | 19 | 11.84 | 3.04 |
| Total | 69 | 13.33 | 2.76 | 29 | 12.07 | 3.28 |
| **Relational Concepts-Pre-Math Inventory** | | | | | | |
| 5 | 28 | 16.75 | 1.50 | 10 | 14.60 | 1.77 |
| 6 | 42 | 16.12 | 2.35 | 19 | 15.42 | 2.50 |
| Total | 70 | 16.37 | 2.03 | 29 | 15.14 | 2.28 |
| **Relational Concepts-Pre-Science Inventory** | | | | | | |
| 5 | 28 | 18.18 | 1.46 | 10 | 16.90 | 3.21 |
| 6 | 42 | 17.88 | 1.86 | 19 | 17.26 | 1.56 |
| Total | 70 | 18.00 | 1.71 | 29 | 17.14 | 2.21 |
| **Set Matching Inventory** | | | | | | |
| 5 | 28 | 11.14 | 1.38 | 10 | 9.90 | 3.35 |
| 6 | 42 | 10.93 | 1.74 | 19 | 9.63 | 2.21 |
| Total | 70 | 11.01 | 1.60 | 29 | 9.72 | 2.60 |
| **Shape Name Inventory** | | | | | | |
| 5 | 28 | 13.46 | 2.27 | 10 | 11.90 | 3.57 |
| 6 | 42 | 12.86 | 2.86 | 19 | 11.42 | 3.74 |
| Total | 70 | 13.10 | 2.64 | 29 | 11.59 | 3.63 |

Table 24

Summary of Analysis of Variance
Early Childhood Inventories Scores
For E and Ck Subjects by
Pretest and Post Test

| | Source | | |
|---|---|---|---|
| | A(pre and post) | B(subject group) | AB |
| | F | F | F |
| Alphabet Name Inventory | <1 | 1.91 | <1 |
| Body Parts Name Inventory | <1 | 6.87* | 2.65 |
| Numeral Name Inventory | <1 | 2.10 | 1.80 |
| Quantity Matching Inventory | <1 | 3.12 | <1 |
| Related Concepts Inventory-Pre-Math | <1 | 8.68** | 2.22 |
| Related Concepts Inventory-Pre-Science | <1 | 4.83* | <1 |
| Set Matching Inventory | <1 | 7.94** | 3.38 |
| Shape Name Inventory | <1 | 4.78* | <1 |

* $p < .05$ ** $p < .01$

Relational Concepts Inventory/Pre-Science (RCI/PS): Table 23 shows the means, n's, and standard deviations for the E and Ck groups over the two waves. Analysis of variance showed the Subject Group main effects to be significant ($F=4.83$; $p < .05$). No significant wave effect or Wave x Subject Group interaction was obtained (Table 24 and Appendix I, Table VV). As can be seen in Table 23 the significant effect is due to the higher scores of the children.

Set Matching Inventory (SMI): N's, means, and standard deviations for the E and Ck groups over the two waves are listed in Table 23. Once more, analysis of variance (Table 24 and Appendix I, Table WW) revealed only a significant Subject Group main effect ($F=7.94$; $p < .01$). The difference again was due to higher E group scores.

Shape Name Inventory (SNI): Table 23 shows the n's, means, and standard deviations for the E and Ck groups over the two waves. As in the BPNI, RCI/PS, and SMI, analysis of variance (Table 24 and Appendix I, Table XX) revealed only the Subject Group main effect to be significant ($F=4.78$; $p < .05$). The direction of the difference again indicated E group superiority.

## QUALITATIVE EVALUATION

In addition to the quantitative results just presented, the Institute has gathered information of a qualitative nature, which provides another measure of the relative influence of the program. This qualitative information has been culled from anecdotal records, open-ended interviews, unsolicited letters written to the Institute, questionnaires, observers' records, etc. These evaluations will be summarized below.

An index of attitudes of school administrators toward the IDS program was obtained by interviewing four principals and five assistant principals. These interviews (conducted in the 1967-1968 school year) consisted of open-ended, unstructured discussions with the Early Childhood Coordinator for the district; the administrators were interviewed one at a time. All the administrators interviewed expressed favorable opinions about the enrichment program, stressing primarily the strength of the IDS materials and personnel. Moreover, the school administrators called for greater involvement of the IDS program with the rest of the school. As will be discussed later, the Institute has responded partly by initiating training sessions and workshops for principals and other non-Institute personnel.

The Institute's own supervisors were asked to write summaries of their impressions of the IDS program, outlining the major successes and failures they saw in it, as well as making suggestions for future change. The majority of the supervisors wrote what appeared to be balanced summaries. A major success which they emphasized was the individualization of instruction in the IDS classroom. Among the weaknesses referred to, the most frequent was characterized as the failure of the in-service training program to meet its stated goals. (See Procedure Section of this report).

In the 1967-1968 school year, group interviews were held by the research staff with teachers, assistant teachers, substitute teachers, and all other teaching personnel who were involved with the IDS classroom program. Again, an apparently balanced response was obtained. Teachers stressed the success of the IDS program in terms of changing children's behavior (e.g., the children seemed better able to work in an independent fashion), while they responded negatively to the fact that the materials had changed from year to year (such as when the Sullivan reading materials were introduced) especially since they felt that the guidelines provided for the implementation of new materials were inadequate.

Of all the groups whose qualitative reactions are reported here, parents and older siblings have given the most positive response. Older children have proudly brought their friends to observe their younger siblings working in the IDS classroom (viewing the classroom from behind a two-way mirror). Parents have repeatedly sent positive letters to the Institute about the program and about their children's performance in it. Information from parents was also obtained from interviews and informal conversations with the Community Aides. In general, those parents whose children entered the program at prekindergarten noted changes in the child's level of socialization, in his ability to recognize and label things around him (e.g., pictures of animals, signs, etc.), and in his ability to use language. Parents have noticed such differences in their children as changes in their basic attitudes toward school. In comparing their older children's school careers to these of the enrichment group, parents noted a difference in the rate and quality of learning that takes place in the IDS classroom. Following are quotations from just a very few of the letters from parents to the Institute.

"The Institute helps the children get a better understanding of why school is really important."

"They learn more things and faster."

"It were as though he learned very fast and it is very good."

Letters from parents have also included reference to their own involvemnet with the IDS program and the activities at the Parent Center. They noted that they had received help in such matters as housing, clothing, etc. Parents reported that the activities of the Parent Center seemed to help them feel more confident in talking with their children and being involved with their school experiences.

"Because of the lesson plans at the Center and the instructions given by the Institute, I am able to converse with my children."

"Before this I was very much embarrassed when my children would ask me questions and I could not answer them. After entering the Center's program, I can now talk with them and don't feel embarrassed. I now have confidence in myself and feel secure."

Reports from teachers who have received IDS children into their classes consistently emphasize the fact that the Institute children are easily identifiable: not only by their overall "verbosity," but by their command of the language. These teachers report that IDS children are genuinely interested and excited about learning, that they are more independent than other children and do not shy away from new situations.

Visitors to the Institute classrooms have consistently remarked on the independence shown by IDS children. In fact, this aspect of children's behavior has been an area of extensive research directed toward the assessment of classroom behavioral correlates of independence (Schumer and Deutsch, 1969).

It should be noted that the funding of the IDS enrichment program never covered any extensive qualitative evaluation. The above summary is only included in this report because the authors believe that it provides valuable supplementary information to the results obtained from standardized tests.

## CONCLUSIONS AND RECOMMENDATIONS

### GENERAL EVALUATION DISCUSSION

The following summary table is presented in order to facilitate the discussion of results from what was a wide variety of measures, taken for four waves of children.

Summary of Results Table

Experimental children scored significantly higher than their controls on the measures listed at the times specified, as follows:

| Test | Testing Period |
|---|---|
| Stanford-Binet | post-prekindergarten<br>post kindergarten<br>post third grade |
| Peabody Picture Vocabulary Test | post-prekindergarten<br>post kindergarten<br>post third grade |
| Lorge-Thorndike | 1st grade<br>2nd grade |
| Reading Prognosis Test | end of kindergarten (only period given) |
| Metropolitan Achievement Tests Reading Subtest-Word Knowledge | 2nd grade (greater than the $C_1$ group only)<br>3rd grade (greater than the $C_1$ group only) |
| Metropolitan Achievement Tests Reading Subtest-Reading | 2nd grade (greater than the $C_1$ group only)<br>3rd grade |
| Metropolitan Achievement Tests Arithmetic Subtest-Problem Solving and Concepts | 3rd grade (greater than the $C_1$ group only) |

| | |
|---|---|
| Early Childhood Inventories<br>Body Parts Naming Inventory<br>Relational Concepts Inventory/ Pre-Mathematics<br>Relational Concepts Inventory/ Pre-Science<br>Set Matching Inventory<br>Shape Name Inventory | All given at the end of kindergarten |
| Illinois Test of Psycholinguistic Abilities 1961 Edition (Complete test)<br>Visual Decoding (calls for the ability to match objects that are conceptually similar)<br>Auditory Vocal Association (calls for the ability to deal with analogies)<br>Visual Motor Association (calls for the ability to associate objects that are functionally related)<br>Auditory Vocal Automatic (calls for ability to handle grammatical forms)<br>Motor Encoding (calls for the ability to express oneself in gestures)<br>Vocal Encoding (calls for the ability to express oneself in words) | at 1st, 2nd and 3rd grades<br>repeated administrations, longitudinal samples |
| Illinois Test of Psycholinguistic Abilities 1968 Revised Edition (Six subtests)<br>Visual Reception (calls for ability to match conceptually similar objects)<br>Auditory Association (calls for ability to handle analogies)<br>Sound Blending (calls for ability to produce a word when supplied with phonemic elements) | 1st, 2nd and 3rd grades, cross-sectional samples |

These findings show positive change for children who have experienced five years of enrichment in the Institute for Developmental Studies' program, as compared with control groups of children who were not in the enrichment program. Experimental children performed better on a number of measures of ability and achievement, and appeared to maintain much of their early enrichment advantage over their controls.

Although the actual achievement levels of the Css-Ck children seem somewhat atypically high for this population (higher than those attained by the population of children in the IDS cooperating schools), their scores follow a pattern that is typically found in schools in low income areas.[1]

On measures of intelligence and achievement, the control children score far below the national norms for their age and grade groups. At the end of kindergarten, Stanford-Binet mean IQs for Css, Ck and $C_1$ groups were 93.00; 92.50; and 84.02, respectively; in contrast, experimental children reached the 100 level on the Stanford-Binet test at the end of kindergarten, and maintained most of their gains over a period of time.

Some cumulative deficit effect is apparent for almost all of the treatment waves (confirming the results of previous research--see Whiteman and Deutsch, 1967) from the end of kindergarten to the end of the third grade. Nevertheless, at the end of the third grade the E group mean was still reasonably close to the national norm for this test (96.71), while the means for the control group children fell far below the national norm. Apparently the program was able to raise the children's S-B IQ scores substantially by the time they entered first grade, but no further gains (and some regression) were evident after first grade. Although early enrichment was reinforced by the continuation of the special program in the first three grades, the inputs to the latter were less systematic and developed than those to the former; reinforcement in the grades was not sufficient to enhance the early gains made in preschool. It must be noted, however, that the control groups showed a decline from the first to the third grades, and maintenance of gains on the part of the E group must be seen in this context.

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1. The pattern of achievement scores for the control children would lead one to conclude that they were a representative group and, in some respects, were appropriate to use for comparison purposes. The actual achievement levels, on the other hand, would lead one to conclude that these children were an atypical group, and should not be used for strict comparisons. A number of factors may have influenced the control children's scores, factors which were characteristic of Css and Ck children but not of their peers who attended the same schools. For example, children in the Css and Ck group came from families that have lived in the same area for a period of five years. This geographic stability is not typically found with disadvantaged populations. Also it is possible that these control children became more test-wise than their schoolmates, and their test results may have been inflated because of this.

The same pattern can be seen in the results of the Peabody Picture Vocabulary Test. Here, again, the differences between experimental and control children were greater at the end of prekindergarten than they were at the end of third grade, though the groups differed significantly at all testing periods. These results corroborate our earlier interpretation that the effects of the IDS preschool program were very strong and positive; those of the less developed grades program, while evident, were less strong and, as will be expanded upon later, less obvious. Parenthetically, one should note that the amount of improvement (or deficit) was greater (or lesser) with each succeeding wave of children. The grades program appears to have increased in its effectiveness with time, and with the development of, and input into this portion of the total five year enrichment curriculum.

The PPVT results themselves pose special and difficult problems for interpretation. For this population, one cannot evaluate the scores in and of themselves, but should interpret them in terms of change and comparisons (see the discussion of the unrepresentative nature of the standardization sample for this test on page 39 Procedure Section). Also, there seems to be some evidence that, given the present type of population, PPVT IQ scores will increase with age, and with exposure to a normal school program; however, it is impossible to accesss the contribution of these factors beyond the prekindergarten year for this study. As can be seen, the Css group showed a 7 point change during the first year, without any systematic educational intervention (the E group gained 14 points during the same time interval); the Css group gained 8 points following exposure to the regular public school kindergarten program. We cannot assume that equivalent changes occurred in later grades; nor can we assume that the changes are reliable measures of the developmental trend.

Up to this point, our discussion has focussed on longitudinal intelligence measures, and has emphasized the fact that the program was quite successful in prekindergarten and kindergarten, and somewhat less successful in the grades. Although the grades curriculum appeared to have been less effective than the preschool program, the early enrichment advantage (i.e. higher means) for the E group was not lost by the end of 3rd grade. While this initial enrichment advantage was obviously a positive finding, it may in itself have contributed to the less impressive later results. The higher means of the E group, attained after kindergarten, may have made it more difficult for them to continue to gain as fast in the grades as they had in prekindergarten and kindergarten: gains from a high baseline are typically more difficult to achieve than those from a lower baseline.

The only notable exception to this pattern is the result of the 1961 version of the Illinois Test of Psycholinguistic Abilities. (As the 1968 version was administered cross-sectionally, results from this test are not applicable to the present discussion.) As can be seen in Figures 2, 3, and 4, total test differences between E and Css groups increased with grade, showing a positive effect of enrichment in the grades.

In relation to achievement in the grades, the results of the Metropolitan Reading subtest do not lend themselves to any clear statement. In addition, our own results shed doubt on the validity of these tests for our population and for the reading program followed in the Institute classes.

In terms of actual achievement levels, experimental children met, or closely approximated, grade level standards. By the end of 3rd grade the E group was less than two months behind grade level in vocabulary skills, and less than three months behind grade level in comprehension skills. Moreover, the third wave (the latest included in this anlysis) scored above grade level on both Word Knowledge and Reading.

However, the comparison of second and third grade data is very confusing. While the mean advantage of the experimentals over controls (on both Word Knowledge and Reading ~~subtests~~) increased from 2nd to 3rd grade, the grade equivalent scores for the E group fall farther below grade level when comparing second and third grade scores for these subtests.

It seems appropriate at this point to mention that the use of grade equivalent scores may have reduced the likelihood of obtaining significant differences between the groups. A two-month grade equivalent difference can be the same as a six-point standard score difference. The manual for the Metropolitan recommends the use of standard scores for statistical purposes. However, as was mentioned in the Procedure Section, the school's decision to administer two different forms of this necessitated the use of grade equivalents rather than standard scores. Moreover, there is some evidence that indicates that the MAT Reading subtest may not be an adequate measure of reading ability in this type of population. The correlation between the Gates-MacGinitie Comprehension subtest and the Metropolitan Reading subtest was only .57 for 19 third grade E children and .25 for 28 third grade C children. Although the n's are small there is a strong possibility that had another instrument been chosen to measure reading the results would have been quite different.

While there is some doubt about the validity of the Metropolitan Reading Subtest for this population there is even greater question concerning the relevancy of the Metropolitan Arithmetic Subtest. As was indicated in the Procedure Section, the Metropolitan Arithmetic Subtest does not tap many of the elements that comprise the IDS curriculum (e.g., sets).

As noted, there were many problems and limitations in attempts to adequately assess the children by means of the published standardized tests. The Early Childhood Inventories (ECI) did, however, provide information that seems to relate more specifically to the IDS curriculum elements, and to tap many of the skills generally considered to be important for young children to have.

While groups generally were not pretested in the ECI prior to educational intervention, pretest equality of groups was inferred from pretest equality on other intelligence measures (notably the Stanford-Binet and Peabody Picture Vocabulary Test.)

Of the five subtests on which significant differences (between E and Ck groups) were found, three of them measure conceptual skills: two relational concepts subtests (Relational Concepts Inventory/Pre-Mathematics and Relational Concepts Inventory/Pre-Science) and the categorization subtest (Set Matching Inventory). Results on the labelling tasks were less impressive. Although the scores indicated that the E group knew Body Parts and Shapes better than the Ck group, differences on other naming tasks (Alphabet letters and Numerals) did not reach significance. In addition, on a task requiring the child to abstract out concepts of quantity despite changes in figural characteristics between standard and comparison pictures (the Quantity Matching Inventory), scores did not significantly differentiate the groups.

It should be noted that, although the skills measured by these inventories are skills taught in the IDS program, they are also generally taught in most cognitively oriented preschool programs. Furthermore, it should be noted that the IDS teachers were not aware of the content or nature of the Inventories; the content was not designed to resemble closely the IDS curriculum materials (insuring that the effects were not simply due to practice and familiarity with specific materials).

The design of this experiment does not permit one to draw any conclusions about the specific elements of the interviewing variable (the curriculum) that were responsible for the specific behaviors demonstrated on the various ability and achievement measures given. However, judging both from the qualitative and quantitative evaluations presented, one can speculate as to the general nature of the change in behavior observed in the children.

First, as can be seen in the curriculum abstract, the IDS program is primarily cognitive and language oriented; the approaches presented emphasize the development of children's thought processes, as well as the facilitation of communication and general language skills.

The relatively high performance of the E children on the Stanford-Binet, Lorge-Thorndike, and the Peabody Picture Vocabulary Test, as well as the grade equivalent scores on Metropolitan Word Knowledge, Reading, and Problem Solving and Concepts portions underscore the effectiveness of those elements of the curriculum that are both cognitively and linguistically based.

In contrast, one can see that on those measures where rote memory or mechanical operations are extremely important, (where the ability to solve problems is not tapped), the children do not score significantly higher than their controls. This is most evident from the pattern of scores on the Computation portion of the Metropolitan Arithmetic Subtest

At this point the limitations of testing procedures, including the ones utilized here, should be stressed. When the IDS evaluation design was first planned, we were faced with a situation in which there existed a paucity of instruments that could assess the mental development of preschool children. Moreover, since longitudinal evaluation was most desirable, the Institute sought to use those instruments that could be applicable to the broad spectrum of ages that would eventually be included in the sample. For those reasons, the Stanford-Binet (S-B) and Peabody Picture Vocabulary Test (PPVT) were chosen as the first major evaluation instruments.[2]

While the Stanford-Binet seems to be a fairly reliable instrument with low SES urban populations, its validity is questionable in terms of the cultural bias inherent in a test developed for, and largely standardized on a white, middle class sample. One of the few extensive investigations that attempts to establish norms for lower class Black children is that of Kennedy et. al., (1963 ), whose sample only included Southern children. Similarly, a search of the available literature did not reveal any study that clearly established predictive validity for a population such as one from which the IDS sample was drawn.

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[2] The Columbia Mental Maturities Scale was also chosen as a test of conceptual ability. It became apparent, however, that the test was rather unreliable with our population and had questionable validity (see Buros, 1965). The CMMS is currently undergoing revision.

For the Stanford-Binet one should also consider many aspects of the testing situation, with the possibility of situational and experimenter variables being operative.[3] Another problem regarding the use of the S-B is its global nature. The instrument cannot be regarded as a true test of the effectiveness of the IDS program because its relationship to the specific curriculum input is not clear. Also, since the subtest scores were not available from the S-B, it cannot be used to separate out differential effects of the various curriculum elements.

The Peabody Picture Vocabulary Test may reflect an even greater degree of cultural bias as its standardization sample was disproportionately weighted with children from the white middle class Nashville area. This bias is especially apparent when children are tested at very early ages; both the black, lower class children from our Northern sample, and those in Klaus and Gray's (1968) Southern sample show initial IQs in the low 60's.

Other standardized instruments, which were used in our evaluation, were the Illinois Test of Psycholinguistic Abilities (ITPA) and the Metropolitan Achievement Tests. The ITPA has recently been revised and its reliability and validity still have not been clearly established. There are some investigators (such as Weikart--cited in Smith and Bissell, 1970) who question its reliability with lower class samples. The cognitive-linguistic nature of the ITPA makes it the kind of instrument that would appear to be most applicable to the IDS program. However, again, the relationship between the ITPA subtests and the IDS curriculum input is not althgether clear; its usefulness as a measure of the effectiveness of specific curriculum elements remains open to question.

A further limitation of our testing procedures should be noted in regard to the Metropolitan Achievement Tests. The Metropolitan Reading Subtest, for example,taps only vocabulary and comprehension; it cannot be regarded as an ideal measure of the IDS reading program which places heavy emphasis on phonics. In addition, the Metropolitan Reading Subtest does no tap such skills as the ability to combine elements and sound out new words. This particular skill is one element of a phonics-based reading program that was considered to be important as a learning tool, one which a child could use in approaching new material and developing more advanced reading skills.

The Metropolitan Arithmetic Subtest has similar limitations in terms of this evaluation. The subtest contains a Computations portion, as well as a Problem Solving and Concepts portion. The former portion covers a skill not considered by the IDS curriculum staff to be as important a mathematical skill as some others; hence it is not stressed in the IDS curriculum. Instead, more time is spent in the IDS classroom on conceptual areas (such as set theory) that are not tapped by the Metropolitan Arithmetic Subtest (See pages 21 through 23.)

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[3] For a more detailed discussion of this issue see Deutsch, et. al., 1964.

A second problem in considering the Metropolitan scores is that these test. is administered by school personnel and not by the Institute's testing staff. The results of these are a matter of public record and, especially those from the Reading subtest carry a great deal of weight in determining the progress of a particular school. Since the primary responsibility of Institute teachers is to implement the Institute's program (and report to the Institute's own supervisory staff rather than through regular Board of Education channels), the IDS teacher is minimally concerned with the school's standing in relationship to other schools. In interviews and discussions with staff in various schools, it would appear that considerable stress is placed on preparing children for taking these tests in non-IDS classes.

As was mentioned in several places above, many factors intervened in the operation of this program that modify the extent to which the rigid parameters of a strict experimental paradigm (of experimental vs. control) can be used in interpreting these data. One of these factors, the diffusion of experimental curriculum elements to non-experimental groups, will be discussed here to exemplify the kind of non-quantified and uncontrolled variables that commonly occur in field experiments, and that may have influenced the overall picture of the results presented here.

Diffusion will be discussed here only in terms of its operation within the host schools and of the consequent "contamination" of control groups, whose members were exposed to an undetermined number of elements of the experimental treatment in the non-experimental classrooms. Diffusion has been discussed by others (e.g., Klaus and Gray, 1968) in another vein: vertical diffusion from the one child in an enrichment program to the other children in the family. This problem has not, as yet, been fully explored by IDS. However, a preliminary investigation revealed a tendency for the younger siblings of children in the IDS program to score higher on pretest (prekindergarten) measures than their older brothers and sisters.

The diffusion of curriculum elements to non-experimental classes has occurred both as a result of planned activities, and of less intentional circumstances. For example, at various times the Institute's staff has conducted training sessions for the teachers of regular classes at certain grade levels within the cooperating schools. Also, the principals of several of the host schools have attended IDS workshops, presumably transferring some of the ideas and methods presented there to their own schools. While these activities, and others like them, may have resulted in diffusion, they were considered to be important and desirable by the Institute's staff, whose primary commitment was to the communities in which the program operated, rather than to the strictness of an experimental design.

In addition to these planned activities, other less intentional events have resulted in this type of diffusion. Although IDS teachers made an effort at first to keep their curriculum a "secret" from other members of the regular school staff, this practice was not followed in the later years. The extent and quality of informal communication that occurred among the teachers cannot be readily determined. To give just one further example, it is apparent that this diffusion of the IDS program occurred when a former IDS teacher became a supervisor of regular classes in one of the cooperating schools.

In addition, there were many problems associated with the fact that the Institute's program operated in regular New York City public schools. The physical plants of many of the cooperating schools were in dilapidated condition, were inadequate to meet the schools' needs, and were depressing settings in which to learn. Also, the support staff in these schools was limited, making it difficult to provide time for grade teachers, who worked a full school day, to participate in extensive in-service training activities.

It is obvious that the experimental program itself was only one of a number of possible input variables which may have been operative, and which may have influenced the children's performance. No attempt has been made in this evaluation to systematically tease out the relevant extra-educational variables, and to account for their influence on the children's performance. (For reports on some of these other variables, see Deutsch, et al., 1967.) Indeed, it has been extremely difficult to isolate those specific educational inputs that were responsible for the experimental children's gains or, moreover, to tap those educational inputs that were not measured by the available standardized instruments. In the last analysis, one must rely on both quantitative and qualitative information, and one must view these results in light of all the forces working against the program's success, in order to obtain a fair evaluation of its effectiveness.

## Educational Significance of the Program

The evidence we have just reviewed provides support for the conclusion that, particularly in the preschool years, the IDS experience was successful for the children enrolled in it. We have demonstrated that, under conditions of sustained enrichment and adequate stimulation, children from depressed areas can and do learn.

The effects on the IDS experimental children themselves is, however, but one measure of the program's influence on education in general, for children throughout the United States. The IDS program was a pioneer in the current U.S. preschool movement. Its emphasis on cognitive development in the early years has been adopted by many of the more successful early childhood programs including several of the more effective Head Start and day care programs.

In addition many elements and ideas from the IDS program have been incorporated into programs in other communities throughout the nation, such as the Far West Regional Laboratory, Follow Through Model, the Interdependent Learning Follow Through Model and the IDS Planned Variation Model. Portions of our program and approach have been disseminated into communities in nearly every state of the union, the Virgin Islands and Jamaica, the British West Indies, etc.

## Recommendations for Future Work

Preparing guidelines for future work in this area, based on the decade of experience in research, in training, and in the classroom itself, is no simple task.

Many of the things that were learned as the enrichment program progressed were incorporated into it to help make it operate more effectively. Indeed, although we have outlined some general approaches and techniques, no single description of this curriculum could ever adequately reflect its nature, for it was designed to be continuously evolving, and at no point in time represented a monolithic entity, with each teacher mediating the purposes and approaches of the program in her own classes.

One of the most important recommendations that can be made for evaluation efforts is related to the development and utilization of more relevant measures, those that have been properly standardized and validated for use with this population. One should attempt to develop and use measures which have the intrinsic capacity to measure the child's responsiveness, and also to measure the ability of the system to respond to the child.

However, the problems of designing and evaluating the effects of an enrichment program go far beyond developing more valid measures, or devising experimental designs which take into consideration all the extra-school and uncontrolled variables which have influenced the children's behavior and development.

Enrichment programs operate within an entire social context, and often within a framework with many conflicting socio-political forces which restrict program effectiveness and make it difficult to extrapolate from these experiences to the future. Such extrapolation is obviously desirable for enrichment programs and for the parents, teachers, and children involved. There is characteristically general social pressure for immediate gains on such measures as achievement or intelligence test performance, and for the evaluation of the success of a program on a ratio scale where one divides numbers of IQ points raised by dollars to get an index of success.

In the long run, only the children are short-changed by this state of affairs. Directors of enrichment programs are continually pressured into affirming that each element of their program reflects the most effective method. Frequently, children must settle for a program's first efforts, simply because the program is penalized for any "mistakes" by threats of cessation of continuing financial support.

Long term commitments are necessary so there can be an interplay of innovation, training, evaluative feedback, and parental as well as community participation. It is necessary for participation and resources to come from all levels of the schools and universities, as well as from the children and their communities. In addition, old experimental-control models are simply not adequate. A special program should allow its influence to evolve and be conscientiously diffused in the entire school setting, incorporating conscious feedback mechanisms. As previously pointed out, considerable diffusion takes place anyhow; boundaries become artificial and reflect statistical artifacts, not social realities.

There is also an ethical issue involved in relegating a group of children as no recipients of long term treatment that one is now reasonably sure will be beneficial to the children who are receiving the appropriate inputs.

# SUPPLEMENTARY
# AND APPENDIX
# MATERIALS

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## APPENDIX I-SUPPLEMENTARY TABLES

Table A

Analysis of Variance of Attrition Effect
on Stanford-Binet IQ Scores
for E and Css Groups (3 Waves)

| Source | df | MS | F |
|---|---|---|---|
| Total | | | |
| Between | | | |
| Subject Group (A) | 1 | 12.52 | <1 |
| Drop-Out Time (B) | 5 | 221.04 | 1.44 |
| AB | 5 | 129.56 | <1 |
| Within | 268 | 153.34 | |

Table B

Analysis of Variance of Attrition Effect
on Stanford-Binet IQ Scores
for Ck Group (3 Waves)

| Source | df | MS | F |
|---|---|---|---|
| Total | 123 | | |
| Drop-Out Time | 4 | 202.42 | 1.58 |
| Within | 119 | 127.80 | |

## Table C

## Analysis of Variance of Attrition Effect on Stanford-Binet IQ Scores for $C_1$ Group (3 Waves)

| Source | df | MS | F |
|---|---|---|---|
| Total | 151 | | |
| Drop-Out Time | 3 | 383.40 | 2.31 |
| Within | 148 | 166.23 | |

## Table D

## Analysis of Variance of Attrition Effect on Peabody Picture Vocabulary Test Scores for E and Css Groups (3 Waves)

| Source | df | MS | F |
|---|---|---|---|
| Total | | | |
| Between | | | |
| Subject Group (A) | 1 | 42.03 | 1 |
| Drop-Out Time (B) | 5 | 585.06 | 2.21 |
| AB | 5 | 422.88 | 1.60 |
| Within | 269 | 264.58 | |

## Table E

## Analysis of Variance of Attrition Effect on Peabody Picture Vocabulary Test Scores for Ck Group (3 Waves)

| Source | df | MS | F |
|---|---|---|---|
| Total | 163 | | |
| Drop-Out Time | 4 | 73.86 | 1 |
| Within | 159 | 362.29 | |

## Table F

## Analysis of Variance of Attrition Effect on Peabody Picture Vocabulary Test Scores for $C_1$ Group (3 Waves)

| Source | df | MS | F |
|---|---|---|---|
| Total | 150 | | |
| Drop-Out Time | 3 | 422.71 | 1.16 |
| Within | 147 | 363.34 | |

## Table G

## Analysis of Variance of Stanford-Binet IQ Scores at Pre-Prekindergarten for 4 Waves of E and Css Subjects

| Source | df | MS | F |
|---|---|---|---|
| Total | 403 | 155.76 | |
| Between | 7 | 215.05 | |
| Wave (A) | 3 | 463.24 | 2.99* |
| Subject Group (B) | 1 | 78.43 | <1 |
| AB | 3 | 12.40 | <1 |
| Within | 396 | 154.71 | |

* $p < .05$

## Table H

## Analysis of Variance of Stanford-Binet IQ Scores at Post Prekindergarten for 4 Waves of E and Css Subjects

| Source | df | MS | F |
|---|---|---|---|
| Total | 401 | 146.57 | |
| Between | 7 | 685.77 | |
| Wave (A) | 3 | 70.03 | .51 |
| Subject Group (B) | 1 | 4358.76 | 31.82 * |
| AB | 3 | 77.17 | .56 |
| Within | 394 | 136.99 | |

* $p < .0001$

### Table I

### Analysis of Variance of Stanford-Binet IQ Scores at Post Prekindergarten (E, Css, Ck Groups, 3 Waves)

| Source | df | MS | F |
|---|---|---|---|
| Total | 479 | 148.86 | |
| Between | 8 | 822.64 | |
| Wave (A) | 2 | 295.37 | 2.15 |
| Subject Group (B) | 2 | 2820.01 | 20.52* |
| AB | 4 | 87.60 | $<1$ |
| Within | 471 | 137.41 | |

* $p < .0001$

Table J

Analysis of Variance of
Stanford-Binet IQ Scores
at Post Kindergarten

| Source | df | MS | F |
|---|---|---|---|
| Total | 646 | 203.42 | |
| Between | 15 | 1332.39 | |
| Wave (A) | 3 | 356.31 | 2.02 |
| Subject Group (B) | 3 | 5566.04 | 31.52* |
| AB | 9 | 246.53 | 1.40 |
| Within | 631 | 176.58 | |

* $p < .0001$

## Table K

## Analysis of Variance of Stanford-Binet IQ Scores at Grade 3

| Source | df | MS | F |
|---|---|---|---|
| Total | 243 | 179.004 | |
| Between | 11 | 301.91 | |
| Wave (A) | 2 | 892.59 | 5.15* |
| Subject Group (B) | 3 | 399.78 | 2.31 |
| AB | 6 | 56.09 | $<1$ |
| Within | 232 | 173.18 | |

* $p < .01$

## Table L

## Analysis of Variance of Peabody Picture Vocabulary Test At Pre-Prekindergarten

| Source | df | MS | F |
|---|---|---|---|
| Total | 399 | 230.58 | |
| Between | 7 | 520.70 | |
| Wave (A) | 3 | 939.20 | 4.17* |
| Subject Group (B) | 1 | 647.72 | 2.87 |
| AB | 3 | 59.87 | $<1$ |
| Within | 392 | 225.40 | |

* $p < .01$

Table M

Analysis of Variance of Peabody
Picture Vocabulary Test
at Post Prekindergarten

| Source | df | MS | F |
|---|---|---|---|
| Total | 631 | 366.13 | |
| Between | 11 | 1315.47 | |
| Wave (A) | 3 | 711.10 | 2.04 |
| Subject Group (B) | 2 | 5179.77 | 14.83* |
| AB | 6 | 329.56 | $<1$ |
| Within | 620 | 349.28 | |

* $p < .0001$

### Table N

### Analysis of Variance of Peabody Picture Vocabulary Test at Post Kindergarten

| Source | df | MS | F |
|---|---|---|---|
| Total | 659 | 337.34 | |
| Between | 15 | 1468.89 | |
| Wave (A) | 3 | 1115.02 | 3.59* |
| Subject Group (B) | 3 | 5078.88 | 16.33** |
| AB | 9 | 383.52 | 1.23 |
| Within | 644 | 310.99 | |

* $p < .05$ ** $p < .0001$

## Table O

### Analysis of Variance of
### Peabody Picture Vocabulary Test
### Post Grade 3

| Source | df | MS | F |
|---|---|---|---|
| Total | 247 | 221.79 | |
| Between | 11 | 311.95 | |
| Wave (A) | 2 | 380.74 | 1.75 |
| Subject Group (B) | 3 | 730.60 | 3.36* |
| AB | 6 | 79.70 | $<1$ |
| Within | 236 | 217.59 | |

* $p < .05$

### Table P

### Analysis of Variance of Lorge-Thorndike IQ Scores at Grade 1

| Source | df | MS | F |
|---|---|---|---|
| Total | 501 | 113.29 | |
| Between | 15 | 325.10 | |
| Wave (A) | 3 | 464.95 | 4.36* |
| Subject Group (B) | 3 | 882.17 | 8.26** |
| AB | 9 | 92.79 | <1 |
| Within | 486 | 106.75 | |

* $p < .01$ ** $p < .0001$

## Table Q

## Analysis of Variance of Lorge-Thorndike IQ Scores at Grade 2

| Source | df | MS | F |
|---|---|---|---|
| Total | 379 | 146.50 | |
| Between | 15 | 286.40 | |
| Wave (A) | 3 | 3.23 | $<1$ |
| Subject Group (B) | 3 | 635.06 | 4.51* |
| AB | 9 | 264.56 | 1.88 |
| Within | 364 | 140.73 | |

* $p < .01$

### Table R

### Analysis of Variance of Reading Prognosis Test Raw Scores for Waves of E, Css, and Ck Subjects by Wave and Subject Group

| Source | df | MS | F |
|---|---|---|---|
| Subject Group (A) | 2 | 1377.35 | 14.38* |
| Wave (B) | 3 | 274.25 | 2.86** |
| AB | 6 | 412.94 | 4.31 |
| Within | 451 | 95.79 | |

* $p < .01$ ** $p < .05$

## Table S

## Analysis of Simple Effects of Reading Prognosis Test Raw Scores for Waves of E, Css, and Ck Subjects by Wave and Subject Group

| Source | df | MS | F |
|---|---|---|---|
| B for $A_1$ (E) | 3 | 660.40 | 6.89* |
| $A_2$ (Css) | 3 | 302.95 | 3.16* |
| $A_3$ (Ck) | 3 | 136.90 | 1.43 |
| Within | 451 | 95.79 | |
| A for $B_1$ (Wave 1) | 2 | 2078.26 | 21.70* |
| $B_2$ (Wave 2) | 2 | 267.33 | 2.79 |
| $B_3$ (Wave 3) | 2 | 204.18 | 2.13 |
| $B_4$ (Wave 4) | 2 | 116.58 | 1.22 |
| Within | 451 | 95.79 | |

* $p < .01$ ** $p < .05$

## Table T

### Analysis of Variance of Metropolitan Achievement Test, Word-Knowledge Subtest at Grade 2

| Source | df | MS | F |
|---|---|---|---|
| Total | 301 | 55.50 | |
| Between | 11 | 82.68 | |
| Wave (A) | 2 | 38.25 | $<1$ |
| Subject Group (B) | 3 | 159.21 | 2.92* |
| AB | 6 | 59.23 | 1.09 |
| Within | 290 | 54.47 | |

* $p < .05$

Table U

Analysis of Variance of Metropolitan
Reading Test, Word-Knowledge Subtest
at Grade 3

| Source | df | MS | F |
|---|---|---|---|
| Total | 242 | 100.40 | |
| Between | 11 | 168.69 | |
| Wave (A) | 2 | 397.39 | 4.09* |
| Subject Group (B) | 3 | 173.79 | 1.79 |
| AB | 6 | 89.92 | $<1$ |
| Within | 231 | 97.15 | |

* $p < .05$

### Table V

### Analysis of Variance of Metropolitan Reading Test, Reading Subtest at Grade 2

| Source | df | MS | F |
|---|---|---|---|
| Total | 301 | 67.35 | |
| Between | 11 | 81.96 | |
| Wave (A) | 2 | 132.18 | 1.98 |
| Subject Group (B) | 3 | 141.94 | 2.12 |
| AB | 6 | 35.24 | <1 |
| Within | 290 | 66.80 | |

### Table W

### Analysis of Variance of Metropolitan Reading Test, Reading Subtest at Grade 3

| Source | df | MS | F |
|---|---|---|---|
| Total | 242 | 87.13 | |
| Between | 11 | 114.04 | |
| Wave (A) | 2 | 226.45 | 2.64 |
| Subject Group (B) | 3 | 141.76 | 1.65 |
| AB | 6 | 62.70 | $<1$ |
| Within | 231 | 85.85 | |

### Table X

### Analysis of Variance of Metropolitan Arithmetic Test, Problem-Solving Subtest at Grade 3

| Source | df | MS | F |
|---|---|---|---|
| Total | 220 | 75.38 | |
| Between | 11 | 118.31 | |
| Wave (A) | 2 | 368.30 | 5.04* |
| Subject Group (B) | 3 | 119.38 | 1.63 |
| AB | 6 | 34.45 | <1 |
| Within | 209 | 73.12 | |

* $p < .01$

Table Y

Analysis of Variance of Metropolitan
Arithmetic Test, Computations Subtest
at Grade 3

| Source | df | MS | F |
|---|---|---|---|
| Total | 220 | 62.35 | |
| Between | 11 | 99.10 | |
| Wave (A) | 2 | 178.27 | 2.95 |
| Subject Group (B) | 3 | 111.28 | 1.84 |
| AB | 6 | 66.62 | 1.10 |
| Within | 209 | 60.41 | |

## Table Z

### Summary Table for the Analysis of Variance of Total ITPA (1961 Version) Scores for Males and Females from Two Schools, Under Two Treatments, Over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Subject Group (A) | 1 | 272766.79629 | 9.43* |
| School (B) | 1 | 20520.82225 | <1 |
| Sex (B) | 1 | 8439.98762 | <1 |
| AB | 1 | 11587.06879 | <1 |
| AC | 1 | 3596.97031 | <1 |
| BC | 1 | 2667.54975 | <1 |
| ABC | 1 | 44181.02175 | 1.53 |
| Subj w grp (E1) | 68 | 28925.72325 | |
| Within | 152 | | |
| Grade (D) | 2 | 1853.79109 | <1 |
| Subj x D | 150 | | |
| AD | 2 | 7537.55633 | 2.76 |
| BD | 2 | 482.74563 | <1 |
| CD | 2 | 1281.58202 | <1 |
| ABD | 2 | 333.74345 | <1 |
| ACD | 2 | 674.65514 | <1 |
| BCD | 2 | 3816.35376 | <1.40 |
| ABCD | 2 | 3716.88026 | 1.33 |
| Subj x D w grp (E2) | 136 | 2727.43873 | |

* $p < .01$

Table AA

Summary Table for the Analysis of Variance of Scores of the Auditory Decoding Subtest of the ITPA (1961 Version), for Males and Females from Two Schools, Under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Treatment (A) | 1 | 37690.99590 | 1.86 |
| School (B) | 1 | 7283.07152 | <1 |
| Sex (C) | 1 | 29801.96686 | 1.47 |
| AB | 1 | 3272.53709 | <1 |
| AC | 1 | 2957.74814 | <1 |
| BC | 1 | 6850.01879 | <1 |
| ABC | 1 | 66302.22080 | 3.27 |
| Subj w grps (E1) | 68 | 20290.30302 | |
| Within | 152 | | |
| Year (D) | 2 | 32389.16105 | 4.77* |
| Subj x D | 150 | | |
| AD | 2 | 21180.65626 | 3.12 |
| BD | 2 | 3173.89186 | <1 |
| CD | 2 | 11437.81151 | 1.69 |
| ABD | 2 | 9510.80847 | 1.40 |
| ACD | 2 | 5564.68684 | <1 |
| BCD | 2 | 16315.82814 | 2.40 |
| ABCD | 2 | 15544.89938 | 2.28 |
| Subj x D w | 136 | 6787.66625 | |

*p < .05

Table BB

Summary Table for the Analysis of Variance of Scores on the Visual Decoding Subtest of the ITPA (1961 Version) for Males and Females from Two Schools, under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Treatment (A) | 1 | 70592.64691 | 7.31* |
| School (B) | 1 | 5031.99320 | < 1 |
| Sex (C) | 1 | 134466.75204 | 12.70* |
| AB | 1 | 61576.85424 | 5.82** |
| AC | 1 | 175.71084 | < 1 |
| BC | 1 | 98.41643 | < 1 |
| ABC | 1 | 16560.28764 | 1.56 |
| Subj s grps (E1) | 68 | 10585.15350 | |
| Within | 152 | | |
| Years (D) | 2 | 35808.27770 | 6.84* |
| Subj s D | 150 | | |
| AD | 2 | 3352.05164 | < 1 |
| BD | 2 | 30969.62254 | 5.92* |
| CD | 2 | 7259.65362 | 1.41 |
| ABD | 2 | 233.00563 | < 1 |
| ACD | 2 | 754.42398 | < 1 |
| BCD | 2 | 2016.31251 | < 1 |
| ABCD | 2 | 3102.31163 | < 1 |
| Subj x D w, grps (E2) | 136 | 5234.47224 | |

* p < .01     ** p < .05

## Table CC

Summary Table for the Analysis of Variance of Scores on the Auditory-Vocal Association Subtest of the ITPA (1961 Version) for Males and Females from Two Schools, under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Treatment (A) | 1 | 130346.57770 | 5.72* |
| School (B) | 1 | 18383.26211 | <1 |
| Sex (C) | 1 | 119.79357 | <1 |
| AB | 1 | 984.31744 | <1 |
| AC | 1 | 5119.28741 | <1 |
| BC | 1 | 1376.19751 | <1 |
| ABC | 1 | 11550.43686 | <1 |
| Subj W grps (E1) | 68 | 22786.26841 | |
| Within | 152 | | |
| Years (D) | 2 | 3727.47795 | <1 |
| Subj x D | 150 | | |
| AD | 2 | 6591.80956 | 1.21 |
| BD | 2 | 1660.01848 | 1 |
| CD | 2 | 23214.06028 | 4.25* |
| ABD | 2 | 737.86818 | <1 |
| ACD | 2 | 1135,05428 | <1 |
| BCD | 2 | 9085.07702 | 1.77 |
| ABCD | 2 | 6658.90008 | 1.22 |
| Subj x D w grp (E2) | 136 | 5457.70787 | |

* $p < .05$

### Table DD

### Summary Table for the Analysis of Variance of Scores on the Visual-Motor Association Subtest of the ITPA (1961 Version) for Males and Females from Two Schools, under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Treatment (A) | 1 | 79517.36993 | 6.44* |
| School (B) | 1 | 14533.84777 | 1.23 |
| Sex (C) | 1 | 4491.03441 | <1 |
| AB | 1 | 21172.69723 | 1.71 |
| AC | 1 | 25530.67303 | 2.07 |
| BC | 1 | 16615.33758 | 1.24 |
| ABC | 1 | 4091.70551 | <1 |
| Subj w grp (E1) | 68 | 12353.60361 | |
| Within | 152 | | |
| Year (D) | 2 | 28804.25683 | 4.89** |
| Subj x D | 150 | | |
| AD | 2 | 1881.46822 | <1 |
| BD | 2 | 540.98429 | <1 |
| CD | 2 | 1347.67766 | <1 |
| ABD | 2 | 230.55670 | <1 |
| ACD | 2 | 2186.79387 | <1 |
| BCD | 2 | 3824.97604 | <1 |
| ABCD | 2 | 2441.78887 | <1 |
| Subj x D w grps (E2) | 136 | 5895.15512 | |

* $p < .05$ ** $p < .01$

## Table EE

Summary Table for the Analysis of Variance of Scores on the Auditory-Vocal Automatic Subtest of the ITPA (1961 Version) for Males and Females, from Two Schools, under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Treatment (A) | 1 | 166471.02268 | 5.27* |
| School (B) | 1 | 189016.75422 | 5.98* |
| Sex (B) | 1 | 28820.55753 | <1 |
| AB | 1 | 5365.71115 | <1 |
| AC | 1 | 1229.10856 | <1 |
| BC | 1 | 7016.08696 | <1 |
| ABC | 1 | 6165.74649 | <1 |
| Subj w grps (E1) | 68 | 31602.30773 | |
| Within | 152 | | |
| Years (D) | 2 | 43858.91072 | 7.14 ** |
| Subj x D | 150 | | |
| AD | 2 | 4015.50802 | <1 |
| BD | 2 | 2290.84795 | <1 |
| CD | 2 | 13795.23980 | 2.25 |
| ABD | 2 | 4697.63751 | <1 |
| ACD | 2 | 7135.54891 | 1.16 |
| BCD | 2 | 3436.94793 | <1 |
| ABCD | 2 | 8925.20770 | 1.45 |
| Subj x D w grps (E2) | 136 | 6140.94405 | |

* $p < .05$    ** $p < .01$

Table FF

Summary Table for the Analysis of Variance of Scores on the Auditory-Vocal Sequential Subtest of the ITPA (1961 Version) for Males and Females from Two Schools, under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Treatment (A) | 1 | 36084.44576 | 1 |
| School (B) | 1 | 16666.86718 | 1 |
| Sex (C) | 1 | 33255.77671 | 1 |
| AB | 1 | 43.72363 | 1 |
| AC | 1 | 5159.89885 | 1 |
| BC | 1 | 9640.27022 | 1 |
| ABC | 1 | 45613.74877 | 1.17 |
| Subj w grp (E1) | 68 | 38966.26887 | |
| Within | 152 | | |
| D | 2 | 306.72868 | 1 |
| Subj x D | 150 | | |
| AD | 2 | 3981.52910 | 1.07 |
| BD | 2 | 7095.95784 | 1.91 |
| CD | 2 | 1980.03771 | 1 |
| ABD | 2 | 1662.79903 | 1 |
| ACD | 2 | 228.05675 | 1 |
| BCD | 2 | 1776.59782 | 1 |
| ABCD | 2 | 667.38468 | 1 |
| Subj x D w grp (E2) | 136 | 3717.45081 | |

## Table GG

Summary Table for the Analysis of Variance of Scores on the Visual-Motor Sequential Subtest of the ITPA (1961 Version) for Males and Females from Two Schools, under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Treatment(A) | 1 | 11383.14422 | 1.20 |
| School (B) | 1 | 1244.31234 | <1 |
| Sex (C) | 1 | 1276.04641 | <1 |
| AB | 1 | 26989.11383 | 2.84 |
| AC | 1 | 58278.39848 | 6.13* |
| BC | 1 | 5196.83691 | <1 |
| ABC | 1 | 11716.91319 | 1.23 |
| Subj w grp (E1) | 68 | 9510.43729 | |
| Within | 152 | | |
| Year (D) | 2 | 44317.39663 | 10.11** |
| Subj x D | 150 | | |
| AD | 2 | 10708.48908 | 2.44 |
| BD | 2 | 6911.39514 | 1.58 |
| CD | 2 | 3816.27723 | <1 |
| ABD | 2 | 587.00390 | <1 |
| ACD | 2 | 1633.53940 | <1 |
| BCD | 2 | 4787.68676 | 1.09 |
| ABCD | 2 | 5865.59931 | 1.34 |
| Subj x D w grps (E2) | 136 | 4384.62245 | |

* $p < .05$ ** $p < .01$

## Table HH

Summary Table for the Analysis of Variance of Scores on the Vocal Encoding Subtest of the ITPA (1961 Version) for Males and Females from Two Schools, under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Subject Group (A) | 1 | 73828.85898 | 5.44* |
| School (B) | 1 | 2455.87022 | <1 |
| Sex (C) | 1 | 37625.02781 | 2.77 |
| AB | 1 | 2587.24520 | <1 |
| AC | 1 | 1458.38978 | <1 |
| BC | 1 | 241.32180 | <1 |
| ABC | 1 | 14429.15594 | 1.06 |
| Subj w grps (E1) | 68 | 13572.48535 | |
| Within | 152 | | |
| D | 2 | 15705.48296 | 3.40* |
| Subj x D | 150 | | |
| AD | 2 | 43002.85607 | 9.31** |
| BD | 2 | 2201.61500 | <1 |
| CD | 2 | 15177.45760 | 3.29* |
| ABD | 2 | 11358.27226 | 2.46 |
| ACD | 2 | 2436.07469 | <1 |
| BCD | 2 | 14497.36889 | 3.14* |
| ABCD | 2 | 2860.07149 | <1 |
| Subj x D w grps (E2) | 136 | 4617.97616 | |

* $p < .05$ ** $p < .01$

## Table II

Summary Table for the Analysis of Variance of Scores of the Motor Encoding Subtest of the ITPA (1961 Version) for Males and Females from Two Schools, under Two Treatments, over Three Years of Testing

| Source | df | MS | F |
|---|---|---|---|
| Total | 227 | | |
| Between | 75 | | |
| Subject Group (A) | 1 | 132817.09050 | 11.91* |
| School (B) | 1 | 34908.70350 | 3.13 |
| Sex (C) | 1 | 26350.50300 | 2.36 |
| AB | 1 | 31707.69481 | 2.84 |
| AC | 1 | 38456.49110 | 3.45 |
| BC | 1 | 966.71574 | <1 |
| ABC | 1 | 438.20569 | <1 |
| Subj w grps (E1) | 68 | 11146.49502 | |
| Within | 152 | | |
| Group (D) | 2 | 59602.93885 | 12.72* |
| Subj x D | 150 | | |
| AD | 2 | 23015.72233 | 4.91* |
| BD | 2 | 4363.56242 | <1 |
| CD | 2 | 1107.78440 | <1 |
| ABD | 2 | 2607.62745 | <1 |
| ACD | 2 | 188.92486 | <1 |
| BCD | 2 | 2846.62787 | <1 |
| ABCD | 2 | 44.99911 | <1 |
| Subj x D w grps (E2) | 136 | 4686.98322 | |

* $p < .01$

### Table JJ

### Analysis of Variance of ITPA (1968 Version) Scaled Scores for E and Ck Subjects at First, Second and Third Grades

| Source | df | MS | F |
|---|---|---|---|
| Subject Group (A) | 1 | 115.44 | 8.65* |
| Grade (B) | 2 | 49.48 | 3.71** |
| AB | 2 | 2.86 | |
| Within | 114 | 13.35 | |

* $p < .01$ ** $p < .05$

### Table KK

### Analysis of Variance of
### Illinois Test of Psycholinguistic Abilities: (1968 Version)
### Auditory Reception Subtest

| Source | df | MS | F |
|---|---|---|---|
| Subject Group (A) | 1 | 106.41 | 2.50 |
| Grade (B) | 2 | 6.82 | <1 |
| AB | 2 | 57.56 | 1.35 |
| Within | 114 | 42.51 | |

Table LL

Analysis of Variance of
Illinois Test of Psycholinguistic Abilities: (1968 Version)
Visual Reception Subtest

| Source | df | MS | F |
|---|---|---|---|
| Subject Group (A) | 1 | 261.07 | 5.07* |
| Grade (B) | 2 | 85.72 | 1.66 |
| AB | 2 | 1.43 | 4 |
| Within | 114 | 51.53 | |

* $p > .05$

Table MM

Analysis of Variance of
Illinois Test of Psycholinguistic Abilities: (1968 Version)
Auditory Association Subtest

| Source | df | MS | F |
|---|---|---|---|
| Subject Group (A) | 1 | 246.53 | 8.38* |
| Grade (B) | 2 | 160.82 | 5.47* |
| AB | 2 | 46.91 | 1.59 |
| Within | 114 | 29.40 | |
| Total | 119 | | |

* $p > .01$

### Table NN

### Analysis of Variance of Illinois Test of Psycholinguistic Abilities: (1968 Version) Visual Association Subtest

| Source | df | MS | F |
|---|---|---|---|
| Subject Group (A) | 1 | 17.63 | >1 |
| Grade (B) | 2 | 78.32 | 3.60* |
| AB | 2 | 33.61 | 1.54 |
| Within | 114 | 21.76 | |
| Total | 119 | | |

* $p > .05$

### Table 00

### Analysis of Variance of
### Illinois Test of Psycholinguistic Abilities: (1968 Version)
### Sound Blend Subtest

| Source | df | MS | F |
|---|---|---|---|
| Subject Group (A) | 1 | 745.01 | 15.80* |
| Grade (B) | 2 | 251.86 | 5.34* |
| AB | 2 | 21.76 | >1 |
| Within | 114 | 47.16 | |
| Total | 119 | | |

* $p > .01$

Table PP

Analysis of Variance of
Illinois Test of Psycholingusitic Sbilities: (1968 Version)
Visual Closure Subtest

| Source | df | MS | F |
|---|---|---|---|
| Subject Group (A) | 1 | 2.14 | >1 |
| Grade (B) | 2 | 9.86 | >1 |
| AB | 2 | 23.80 | 1.01 |
| Within | 114 | 23.40 | |
| Total | 119 | | |

## Table QQ

## Analysis of Variance of Alphabet Name In entory (ANI) for E and Ck Subjects by Pretest and Postest

| Source | df | MS | F |
|---|---|---|---|
| Pre and Post (A) | 1 | 1.89 | <1 |
| Subject Group (B) | 1 | 396.63 | 1.91 |
| AB | 1 | 115.23 | <1 |
| Within | 95 | 207.92 | |

## Table RR

## Analysis of Variance of
## Body Parts Name Inventory (BPNI)
## for E and Ck Subjects by Pretest and Postest

| Source | df | MS | F |
|---|---|---|---|
| Pre and Post (A) | 1 | 1.69 | <1 |
| Subject Group (B) | 1 | 63.94 | 6.87* |
| AB | 1 | 24.71 | 2 65 |
| Within | 95 | 9.31 | |

* $p < .05$

## Table SS

## Analysis of Variance of Numeral Name Inventory (NNI) for E and Ck Subjects by Pretest and Postest

| Source | df | MS | F |
|---|---|---|---|
| Pre and Post (A) | 1 | 7.54 | <1 |
| Subject Group (B) | 1 | 292.14 | 2.10 |
| AB | 1 | 250.46 | 1.80 |
| Within | 95 | 138.95 | |

Table TT

Analysis of Variance of
Quantity Matching Inventory (QMI)
for E and Ck Subjects for Pretest and Postest

| Source | df | MS | F |
|---|---|---|---|
| Pre and Post (A) | 1 | 5.45 | <1 |
| Subject Group (B) | 1 | 27.09 | 3.12 |
| AB | 1 | .19 | <1 |
| Within | 94 | 8.68 | |

### Table UU

Analysis of Variance of
Related Concepts Inventory-Pre-Math (RCI-PM)
for E and Ck Subjects by Pretest and Postest

| Source | df | MS | F |
|---|---|---|---|
| Pre and Post (A) | 1 | .19 | $<1$ |
| Subject Group (B) | 1 | 38.29 | 8.68* |
| AB | 1 | 9.80 | 2.22 |
| Within | 95 | 4.41 | |

* $p < .01$

### Table VV

### Analysis of Variance of Related Concepts Inventory-Pre-Science (RCI-PS) for E and Ck Subjects by Pretest and Postest

| Source | df | MS | F |
|---|---|---|---|
| Pre and Post (A) | 1 | .19 | $<1$ |
| Subject Group (B) | 1 | 17.16 | 4.83* |
| AB | 1 | 1.70 | $<1$ |
| Within | 95 | 3.55 | |

* $p < .05$

Table WW

Analysis of Variance of
Set Matching Inventory (SMI)
for E and Ck Subjects by Pretest and Postest

| Source | df | MS | F |
|---|---|---|---|
| Pre and Post (A) | 1 | 1.13 | $<1$ |
| Subject Group (B) | 1 | 30.56 | 7.94* |
| AB | 1 | 13.01 | 3.38 |
| Within | 95 | 3.85 | |

* $p < .01$

## Table XX

## Analysis of Variance of Shape Name Inventory (SNI) for E and Ck Subjects by Pretest and Postest

| Source | df | MS | F |
|---|---|---|---|
| Pre and Post (A) | 1 | 5.47 | <1 |
| Subject Group (B) | 1 | 42.44 | 4.78* |
| AB | 1 | .07 | <1 |
| Within | 95 | 8.88 | |

* $p < .05$

## APPENDIX II:PRESCHOOL LOGS

### Prekindergarten

A=Activity
O=Objective

| TIME | TEACHER | MATERIALS | ASST. TEACHER | MATERIALS |
|---|---|---|---|---|
| 8:40<br>9:40 | A&O--Work with individual children on cognitive, perceptual and conceptual learning especially mathematics and language prereading skills. | Teacher-made equipment, Alphabet Board, name cards, number materials, sorting materials. | Work with small groups and individuals to develop language skills, perceptual & cognitive. | Formal games: Language Lotto, Matrix Board and the other quiet, work-time materials. |
| 9:40 | A--Music"Punchinello"circle game.<br>O--Movement in original ways, large muscle coordination. | None. | Participates in group, giving aid to children near her. | |
| Whenever Mr. Fisher comes for ½ hour. | A--Music & dance with Andre Fisher.<br>O--Self-expression developing pride in Negro culture, relating to adult Negro male. | Record player, musical instruments. | Reacts and participates as member of the group. | |
| 9:55<br>10:10 | A--Lesson on sets.<br>O--Increase understanding the concept of set. (A) Review previous definition, review specific categories of sets. Children group themselves in various specific sets, e.g., boys, girls, children wearing boots, those wearing blue, etc. | None. | Participates. | |

Prekindergarten (continued)

| TIME | TEACHER | MATERIALS | ASST. TEACHER | MATERIALS |
|---|---|---|---|---|
| 10:10<br>10:40 | A--Children have use of different media to express and develop symbolic representation of world, building, molding, painting. Teacher moves among different groups of children.<br>O--Develop symbolic expression, imitation, make-believe. | Blocks, dollhouse, fingerpaint, clay. | Same. | Same. |
| 10:45<br>11:00 | A--Reads stories and discusses books with individuals and small groups.<br>O--Familiarity with books, ability to tell stories, and enjoy them. | Books. | Same. | Books. |
| 11:05<br>11:20 | A--Reads Whistle for the Train.<br>O--Increase knowledge of trains in preparation for next week's trip to Grand Central. | Book. | Listens, encourages individuals to pay attention if necessary. | None. |
| 11:25<br>11:40 | A--Outdoor play.<br>O--Large muscle movements, cooperative and social play. | Outdoor equipment, including bicycle and doll carriage. | Set up lunch with two children. Aid children in accepting responsibility and doing a necessary job for the good of the group. | Plates, "sil-<br>milk, food, etc. |
| 11:40<br>12:00 | A--Lunch.<br>O--Nourishment, and social conversation. | Food and materials. | Same (each teacher eats with one table of children). | Same. |

## Preschool Logs--Kindergarten

| TIME | TEACHER | MATERIALS | ASST. TEACHER | MATERIALS |
|---|---|---|---|---|
| 8:40 | QUIET WORK<br>Numbers: supply amount for numeral "X" more.<br>Phonics: supply letter for pictures. | Games and material from white cupboard. Free choice when work sheets have been completed. | Administer math inventory I and complete math inventory II with those children who have been absent. | Listening Center. Math test tapes. |
| 9:15 | Group to gym for physical activity and games. Discuss rules for behavior in gym, such as no screaming. |  | Bring children (stragglers) to gym when they have completed tasks in room. |  |
| 9:35 | Music, rhythms, and songs. | Records and guitar. | Assist with music. |  |
| 10:00 | Activity period. | Blocks, clay, crayons, paint, sand, doll area-grocery store. | Play games with children who need help in particular areas. | Ordering game, red and black bingo, phonics lotto. |
| 10:40 | Continue with activities. Prepare tables for lunch. Committee sets correct number of places. | Cups, napkins, mats, plates, silverware. | Take group for rest period as children finish cleaning up. | Songs, records for rest. |
| 10:55 |  |  | Children put away mats, prepare for story time. |  |

Kindergarten (continued)

| TIME | TEACHER | MATERIALS | ASST. TEACHER | MATERIALS |
|---|---|---|---|---|
| 11:00 | Discussion on where things come from before they reach the store as introduction of unit on food and clothing. | Grocery store in doll area.<br>Ask Mr. Bear. | | |
| 11:20 | Children prepare food for tables. | Milk, bread, meat, etc. | | |
| 11:25 | | | Discussion about story. Preparation for lunch. Replace mats, wash hands, go to tables. | |
| 11:30 | Lunch. | | Lunch. | |
| 12:00 | Dismissal. | | Dismissal. | |

## APPENDIX III:MATH--SCIENCE LOGS

Logs taken by teachers during the 1967-68 school year yielded the following specific information about the IDS mathematics-science program, as it had developed to that point. The list is not intended to be definitive or exhaustive but merely to include the essentials of the program:

### PreKindergarten

#### Skills and Concepts:

Rote counting to 10
Rational counting to 5
Recognition of numerals 1-5
Identifying numbers by name
Sequential ordering of numerals 1-5
Beginning the concept of set (one-to-one correspondence)
Concepts of size, e.g., long, short; shape, e.g., triangle, circle; one-to-one correspondence; quantity, e.g., whole, more, less
Polar opposites
Introduction to measurement

#### Materials Used:

Teacher made materials, e.g., lotto, sorting games
Daily individual calendar
Stern manipulative materials
Number songs, charts, fingerplays
Concrete materials, e.g., funnels, spoons
Flannelboard plus objects and pictures
Montessori materials
Number puzzles

## Kindergarten

### Skills and Concepts:

Recognition of numerals 1-10
Rote counting to 20
Rational counting to 10
Introduction to term "set"
Matching sets
Introduced number combinations 1-5
Simple addition and subtraction with concrete materials
Ordering of numerals 1-10
Writing numerals 1-5
Time: telling the hour
Calendar: week, month
Measurement: introduction to cups, pints, quarts, etc.
Concept of before, after, more, less, same as
Reading a thermometer
Introduction to concept of shapes, e.g., hexagon, triangle, diamond, etc.

### Materials Used:

Teacher-made games, e.g., lotto, bingo, Stern manipulative materials, Cuisenaire rods
Montessori rods
Concrete materials
Calendars
Thermometers, measuring cups, clocks, etc.
Shapes, e.g., diamond, square
Unifix cubes, pattern boards
Stacking squares

## First Grade

### Skills and Concepts:

Review: concept of sets
One-to-one correspondence
Recognition and writing of numerals
Concept of addition
Addition facts 1-6
Introduced:
Commutative property of
Addition
Writing equations
Counting by 2's, 10's, etc.
Recognition and verbalizing of addition symbols
Using number line for addition
Concept of subtraction

Recognition and verbalizing of subtraction
Symbols using number line for subtraction
Time: 1 hour, half hour

Materials Used:

- Houghton-Mifflin Math Series
- Math Lab (supplementary IDS)
- Mathematical Objectives
- Supplements
- Unifix Cubes
- Stern Manipulative materials
- Individual number lines
- Teacher-made materials
- Commercial games
- Number Pole
- Language Master
- Science - a process approach
- Cuisenaire rods

### Second Grade

Concepts and Skills:

Reviewed:concept of sets
Number concepts 1-10
Addition and subtraction 1-10
What "equal" means
Introduced:
Concept of set as it relates to multiplication, place value, column addition and subtraction, changing in addition, simple multiplication
Time: Review 1 hour, half hour
Money: make change, solve problems
Measurement:
Introduced: ruler, pints, quarts, etc.
Fractions: 1/4, 1/3, 1/8
Concept of adding and multiplying fractional parts (one class)
Roman numerals I-XII (one class)

Materials Used:

- Math Lab
- IDS mathematical objectives
- Houghton-Mifflin series
- Stern Series
- Teacher-made games and materials

One-child made games
Stern Manipulative Materials
Cuisenaire Rods
Unifix Cube
Science - A Process Approach
Listening Center, e.g., tape - How Big is Big
Snack Program - some teachers have used this as part of the regular math program to provide additional concrete experiences.

## Third Grade

### Concepts and Skills:

Reviewed: number facts (slow group)
Simple multiplication and division
Place value
Exchange in addition and subtraction
Application of addition and subtraction toward problems and practical situations
Introduce: complex multiplication and division operations, mixed operations
Application toward problems and practical situations, work with fractions and graphs

### Materials Used:

Same as Second Grade

# APPENDIX IV: STAFF LISTING

## Curriculum Social Service, and Training

Abraham, Ruth
Alexander, Adeline
Alston, Frances
Andrews, Phyllis
Bahadur, Dorethea
Bangsgaard, Sandra
Barnett, Edna
Bernier, Barbara
Billups, James
Blumstein, Rebecca
Bodden, Edna
Bowler, Lawrence
Calhoun, Edith
Cannaday, Jonnie
Carter, George
Cato, Alline
Cato, Sandra
Church, Alexandria
Clarke, Naomi
Clibansky, Freya
Collier, Lucy
Council, Karolyn
Craig, Darlene
Danavall, Elaine
David, Barbara
Diamond, Esta
Diamond, Julie
Drager, Thomas
Drew, Helen
Ehren, Joan
Ellis, Laura
Embree, Suzanne
Feeley, Dianne
Feeley, Gillian
Fondiller, Fay
Gaynor, Susan
Fisher, Andre
Glick, Charlotte
Gravel, Douglas
Gravel, Maria
Gropp, Jane
Gwathmey, Emily
Halpin, Martha
Harrison, Frederick
Heyward, Lolita
Higgs, Sylvia
Hirsch, Susan
Holtzman, Emily
Holtzman, Harriet
Hosansky, Roberta
Howells, Polly
Ilson, William
Jackson, Annette
Jackson, Jacquelyn
Jackson, Joslyn
Jacobson, Jill
Jenkins, Odessa
Kelly, Carolyn
Lacey, Diane
Lefevre, Gail
Liebowitz, Gail
Lloyd, Jean
Loughlin, Rita
Magid, Joan
Margolin, Barbara
McCluskey, Barbara
McKay, Amabel
Meyers, Edwina
Obey, Cheryl
Padva, Michael
Pasamanick, Judith
Philbrick, Sharon
Phillips, Laurie
Ponder, Edward
Raymond, Monica
Robins, Clarence
Saxe, Caroline
Scott, Rochelle,
Spiegel, Jeffrey
Spruill, JoAnna
Sternberg, Birgitta
Steinberg, Marion
Stevens, Mary
Stuchin, Jacquelyn
Thaler, Helen
Thomas, Betsy
Turner, Miles
Tynes, Jacquelyn
Wedderburn, Janette
Wilson, Barbara
Winzelberg, Joan
Yellin, Judith
Haynes, Elna

## APPENDIX IV (continued)

### Research and Evaluation

Barry, Linda
Bartosh, Karen
Beltran, Maria-Paz
Binder, David
Blin, Karla
Brown, Bert
Caudle, Fairfid
Chesler, Phyllis
Cohen, Barbara
Coleman, Richard
Coller, Alan
Cossis, Calliope
Cutler, Rhoda
Dalton, Sandra
Deutsch, Cynthia
Dill, John
Feldmann, Shirley
Friedman, Helene
Goldstein, Leo
Gorrell, Judith
Gotkin, Lassar
Gottfried, Marvin
Hackett, Elizabeth
Hellman, Marsha
Jimenez, Dolores
Kaley, Maureen
Karp, Barry
Kreuzer, Judith
Kuppersmith, Judith
Lombardi, Karen
Maliver, Alma
McMartin, James
Mechanek, Ruth
Miller, Theresa
Millman, Susan
Neuberger, Meyer
Peisach, Estelle
Pollack, Barry
Richardson, Ellis
Sasso, Joanna
Schmidt, Dorothy
Schneider, Paul
Schwartz, Judy
Sher, Abigail
Silverstein, Sophie
Soloman, Linda
Stein, Lana
Taleporos, Elizabeth
Schumer, Florence
Tehan, Sarah
Tilis, Howard
Victor, Jack
Wein, Norman
Whelan, Janet
Wich, Barbara
Zawel, Daniel
Faigao, Bataan

### Administration

Boulware, Fay
Covert, Angela
Ellis, Richard
Hamburger, Samuel
Montgomery, Dargan

### Consultants

Almy, Millie
Beilin, Harry
Fleiss, Bernice
John, Vera
Kaplan, Jerome
Katz, Phyllis
Knisely, Sally
Lesser, Anna
McSweeney, Joseph
Shaw, Ann
Weiner, Max
Whiteman, Martin
Wilensky, Harold

## APPENDIX IV (continued)

### Secretarial and Clerical

Adeeb, Karen
Alexander, Judith
Anderson, Phyllis
Arruebarrena, Marilyn
Bender, Norval
Bondarin, Arley
Bradford, Lawrence
Breland, Leslie
Bright, Evelyn
Caylor, Ruth
Campbell, Lil
Clement, Ruth
Cobbs, Robert
Coleman, Ricky
Cynoe, Winston
Dawson, Millanese
DeFord, Cecelia
Devinne, Phyllis
Drayton, Patricia
Driver, Phyllis
Finkelstein, Rochelle
Fiorello, Barbara
Fiorello, Josephine
Fowler, Charles
Frazier, Rupert
Gebo, Ann
Gilliam, Willie
Goodwin, Brian
Graves, Annette
Greenblatt, Ira
Gregory, Alan
Gully, Catherine
Haith, William
Herring, Alfred
Hinds, Burmadine
Hurwitz, Lynda
Isa, Salima
Jackson, Cynthia
Jones, Templeton
Joyce, Michael
Kerr, Carol
Kirkland, Linda
Koinis, Mary Ellen
Leggett, Joanne
Leo, Diana
Lerman, Paulette
Linder, Esther
Lort, Emily
Madison, Linda
Mouser, Janina
Monks, Charlotte
Murga, George
Orleans, Lila
Ortiz, Elsie
Payne, Marjorie
Rabinowitz, Cynthia
Rae, Irene
Robertson, James
Robinson, Mary Ann
Sansalone, Frances
Santiago, Elsie
Simmons, Bert
Smith, Juanita
Stanwood, Caroline
Stewart, Carolyn
Strauss, Carolyn
Taylor, Redessa
Tiska, Joan
Underwood, Margaret
Walker, James
Walton,-Fischler, Shirley
Warren, Pauline
Wein, Carol
Weng, Charles
Westerfield, Priscilla
Wittner, Marjorie
Zalamea, Eduardo